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ABSTRACT

This document describes the use of educational technology (including radio, television, computers, telephones, satellites, and optical laser discs) in adult literacy programs in Australia. Chapter 1 describes the scope of the study that resulted in the document and defines both literacy and educational technology. Chapter 2 contains a generalized set of questions that can be asked about any educational technology and that provide a framework for evaluating educational technology. Chapter 3 describes the use of educational technology in adult literacy programs in Australia. Descriptions of the technologies in use are included for print media, audio material supporting print material, radio, video and television, subtitling, computers, drill and practice, simulation programs, word processing, word and text manipulation, story programs, databases, computer peripherals, teleconferencing, optical laser discs, CD-ROM, videodisc, and hypermedia. Chapters 4-9 present case studies of the use of technology in particular literacy programs. Chapter 10 describes computer software programs that are appropriate for use in adult literacy classes. Chapter 11 is devoted to an exploration of the uses of HyperCard and HyperStory in adult literacy learning. Chapter 12 considers emerging issues and the potential of using educational technologies in adult literacy education. The document concludes with 121 references. (CML)

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The Use of Technology in Adult Literacy Programs

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CE 054878

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Preface

This Report on the use of technology in adult literacy programs was commissioned by the Department of Employment, Education and Training, and was conducted under the auspices of the Adult Literacy Action Campaign, as part the Federal Government's National Policy on Languages.

The study was directed by Jonathan Anderson, Professor of Education at Flinders University. Alison Cheetham acted as research assistant for the duration of the project. Richard Grice, Senior Lecturer in Education at the University of Queensland, joined the research team for part of his study leave, during which time he assisted in the evaluation. The fourth member of the research team was Brian Marshall who participated in some of the case studies as part of a Master of Education degree.

Thanks are due to the representatives of the Australian Council of Adult Literacy in the different States who assisted in providing information about developments in technology in their States, and especially to Linda Are, Marian Norton, Christine O'Callaghan, Colleen Smith, and Aileen Treloar. To the many officers within TAFE who provided further information, we gratefully acknowledge their help: Jennifer Cameron, Brian Kenworthy, Vic Margan, Brian Nussey, Rosie Wickert, Julia Zimmerman. Those who were involved in developing the technology described in this Report were most open in sharing with us current developments and future projections, and here we acknowledge the professionalism of Trevor Lloyd, Herb Peppard, and Tony Schick. To the many teachers and administrators – Jenny Charlesworth, Lorraine Glacken, Rebecca Noble, Anita Steinerts, Don Strempl, as well as many others – and to all students in adult literacy classes with whom we spoke, we thank them for the time they freely gave. This Report was only possible because of the help of all these people.

Jonathan Anderson
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Richard Grice
Brian Marshall

January, 1990

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1 Scope of Report

The aims and purposes of this national report on the use of technology in adult literacy programs are described first in this Chapter. Next, the extent of adult illiteracy in Australia is reported, together with a brief consideration of those institutions and organisations which provide assistance to adults with literacy problems. Before describing how technology is being used in adult literacy programs, it is necessary to analyse what is implied by the term *literacy* as well as to consider those for whom literacy programs are established; what is included in *educational technology* needs also to be determined. The Chapter concludes with a discussion of these questions.

Aims and purposes

The major aim of this enquiry is to report on the use of technology in literacy programs and projects around Australia which cater for the special needs of adults. A particular focus is those literacy programs that utilise, as part of teaching and learning, what are commonly called *the new technologies*. These so-called *new technologies*, defined in more depth below in this Chapter, include not only computers, but also radio, television, video, telephone, satellite, and optical laser disc.

The purpose of the study is, in part, to provide a description of some of the ways these technological tools are being used in conjunction with more traditional learning materials to assist adults acquire literacy. As a guide to teachers and administrators who might contemplate their use, an attempt is made also to gauge the effectiveness of these newer approaches, as well as to evaluate the potential of technologies for literacy teaching.

The study was conducted under the auspices of the Adult Literacy Action Campaign as part of the National Policy on Languages, announced by the Federal Government in December 1987. Implementation of the National Policy is overseen by the Australian Advisory Council on Languages and Multicultural Education (AACLAME).

Extent of adult illiteracy in Australia

Adult illiteracy in Australia has not always been recognised as an issue. The Duncan Report on *Adult Education in Australia* (1944) appears to be the first public recognition that illiteracy is a severe problem, not only for those adults afflicted but for society as a whole:

> Illiteracy is not only a cruel and unjust handicap, from the point of view of the individual, but a disgrace and indeed a menace, from the point of view of society. The illiterate feels himself 'something less than a full man, something of a social deformity because he cannot read or write. For the most part he resists revealing his deficiency and sometimes he becomes magnificently ingenious in subterfuge to hide it' (Duncan Report 1944: 106).

Despite this enlightened and compassionate view, general awareness that illiteracy is a problem for adults in a technologically advanced society like Australia has been slow to emerge. Unesco statistics reporting a literacy rate of virtually 100 per cent for Australia would appear to have supported this general lack of awareness. However, Unesco statistics do not relate specifically to adults and, besides, there has been considerable demographic change in the composition of the Australian population in recent decades.

Two major studies in the last decade and a half indicated, for the first time, the magnitude of the illiteracy problem pointed to in the Duncan Report on *Adult Education* more than forty years ago.

First, the Australian Council of Educational Research (ACER) completed a nationwide survey of student performance in 1975, which was followed up five years later (Bourke *et al.* 1981). The key finding, as far as adult illiteracy is concerned, was that 17 per cent of students in the last year of compulsory schooling failed to reach the minimum criterion of mastery set for everyday reading tasks. Assuming these 17 per cent of students are not part of the cohort electing to continue at school, this finding, extrapolated to the country as a whole, means that each year 40,000 enter the work force without an adequate mastery of literacy, at least as measured by the ACER tests. Although the retention rate has improved markedly in more recent years, the ACER findings suggest that significant numbers regularly enter the world of work without an adequate literacy base.

The second study, more commonly cited, was designed to estimate how many adults lacked such survival skills as being able to use a telephone directory, to comprehend newspaper advertisements for housing and employment, or to complete simple application forms. Goyen (1977) conducted the study in metropolitan Sydney, using a random sample of adults aged 16 years and over. Again extrapolating to Australia, Goyen estimated there would be 850,000 adults unable to read printed materials described as necessary for survival. Of this total, an estimated 320,000 adults would be from English speaking backgrounds and 530,000 from non-English speaking backgrounds. This metropolitan-based study could not, of course, determine how many illiterate adults might be of Aboriginal background, or how many with literacy problems live in remote areas.

The Goyen and ACER studies, then, as pointed out elsewhere (Anderson 1985), demonstrate there certainly is a literacy problem. Not only do adults from non-English speaking backgrounds and those with physical or intellectual handicaps experience difficulties in coping in today's technological society, but there are apparently significant numbers leaving school annually who, for one reason or another, have failed to master reading and writing at a sufficient level to allow them to function adequately at the next stage of their lives.

A preliminary report of a just completed nation-wide survey, directed by the Vice-President of the Australian Council of Adult Literacy, appears to confirm these previous findings (Wickert 1989). Literacy was broadly conceived in this survey as comprising three dimensions: *document literacy* – being able to use and identify information in forms and memos; *prose literacy* – being able to read and interpret text in newspapers and books; and *quantitative literacy* – being able to perform simple number operations in such items as deposit slips and menus. There were only twenty-four items in the survey but the sample of nearly 1500 adults aged over 18 purports to be representative of urban and rural communities across Australia. Further analysis is planned to try to explain variations in literacy performance by providing estimates of the proportion of adults in different sub-groups who successfully complete literacy tasks within each of the three dimensions. An interesting aspect of the preliminary report, giving rise to its title – *No Single Measure* – is the quotation cited on the title page: "There is no single measure or specific point on a scale that separates the *literate* from the *illiterate*". It is this philosophy that underlies the survey by Wickert.

Adult literacy provision

The most comprehensive survey yet of adult literacy provision in Australia was completed by Dymock who reported that in 1980 there were 179 adult literacy schemes operating in all States and Territories, the first being offered as late as 1965 (Dymock 1982). Although the number of literacy schemes today is far in excess of those reported almost a decade before, the main trends noted by Dymock are likely still to hold. That is, that the major provider is the Department of Technical and Further Education (43 per cent of schemes), with community-based schemes being the next most frequent (31 per cent), and State Education Departments and Colleges of Advanced Education providing most of the remaining schemes (27 per cent).

The two most frequently stated objectives of the literacy schemes surveyed were to develop reading, writing and numeracy skills, and to build up adults' self-confidence, encouraging them to be independent members of society. In a subsequent report, Dymock (1983) stated:

> The Australian experience has been that as adults are becoming more aware that help is available, and as community support for their plight grows, more are seeking help. A continuing difficulty is that many program co-ordinators do not want to spread the word too widely because they fear they will be inundated with requests for assistance which they cannot meet (Dymock 1983: 114).

Other problems Dymock noted are how to cater for the needs of the geographically isolated in rural areas and how to provide for groups with special needs – migrants, Aborigines, and the handicapped.

Strangely, Dymock made no mention of English courses for migrants, begun in Australia as long ago as 1947. The Adult Migrant Education Program (AMEP) was established under the Immigration (Education) Act 1971-73 to enable the Commonwealth to arrange courses for migrant adults (Mackellar 1978: 1). Today, AMEP functions to provide settlement information to adult migrants from non-English speaking backgrounds, as well as to make available a range of English language learning opportunities to help them function at a basic level in the community, and to acquire skills needed to continue to learn English autonomously and to access educational and mainstream services (Campbell 1986: 49).

A review of adult literacy services in New South Wales (Parry 1989) identifies the Adult Migrant Education Program as a key provider of literacy services in that state. However, by far the biggest provider is TAFE, confirming Dymock's findings, and this picture is reflected in all states. Other providers of literacy services noted in the Parry report are Evening Colleges, Community Groups, WEA, and the Department of Corrective Services.

Defining literacy

Literacy is an elusive concept for it is both relative and dynamic. As noted by Anderson (1975: 88), the meaning we give to literacy changes with time and according to place; a meaning that would fit one particular period and one walk of life would not be appropriate at another period and in a different place.

Goyen (1977), in her survey of adult illiteracy in Sydney, defined literacy in terms of functional skills – the ability to use a telephone directory, to comprehend newspaper advertisements, and complete simple application forms. It would seem from the objectives stated in many of the literacy schemes surveyed by Dymock (1982), that a wider definition of literacy was generally implied, which embraces the development of reading, writing and numeracy skills, as well as self-confidence building.

The Australian Secretariat for International Literacy Year (ILY) in 1990 adopted a wider definition still which includes cultural and critical components (see **Panel 1.1**).

This wider, more encompassing approach to literacy was the starting point for this report on the use of technology.

Panel 1.1

What is literacy?

Literacy involves the integration of listening, speaking, reading, writing and critical thinking; it incorporates numeracy. It includes the cultural knowledge which enables a speaker, writer or reader to recognise and use language appropriate to different social situations. For an advanced technological society such as Australia, our goal must be an active literacy which allows people to use language to enhance their capacity to think, create and question, which helps them to become more aware of the world and empowers them to participate more effectively in society.

Australian ILY Secretariat

However, as already stated, technology changes the tools we use, and now new technologies are changing our concepts of text (Anderson 1989). As an instance of this, Lauterbach (1988) comments that new information and communication technologies usher in more user-friendly software with mouse, light pen and touch screen as alternatives to text entry via keyboard. The use of icons – graphic representations of keyboard functions – provides an alternative to text reading. He concludes:

> With new information and communications technology *reading and writing* will have to extend its meaning to encompass proficiency in symbolic, graphic and pictorial information control, i.e. receiving, comprehending, analysing, reflecting, producing and sending (Lauterbach 1988: 93).

The implications for education are clear. Our new technological tools require literacy users to receive, comprehend, analyse, reflect, produce and send a wider range of visual information than our former tools like pencil and paper. To Lauterbach's symbolic, graphic and pictorial information, adults in today's society are bombarded by, and need to comprehend, animated graphic displays, dynamic text, sound, and full motion video.

Literacy learning, then, embraces not only the integration of listening, speaking, reading, writing, thinking and numeracy but also the interpretation of the many diverse ways of rendering information in today's world – visual, aural and tactile – that new technological tools are making possible. As well, it includes the information, knowledge, and understanding needed by adults in order to live full and rich lives. Literacy learning thus includes functional, cultural, critical and technological literacy. It is this all encompassing concept of literacy that was adopted for this report on the use of technology in adult literacy programs and projects around Australia.

Literacy for whom?

It was noted in the preceding section that literacy is a relative concept, its meaning changing with time and place. It is important, therefore, to consider for whom literacy programs are established.

In the same way that a wide, encompassing definition of literacy proved necessary for our purposes, so also is it critical to take a wide-angled view of the clients in adult literacy programs. Too often there is a tendency to regard adults seeking or in need of help in becoming literate as relatively homogeneous, or to regard one kind of organisation, or worse, one kind of teaching methodology, as the appropriate model for providing literacy instruction. In Goyen's (1977) investigation noted above, and in the review of literacy projects which follows in Chapter 3, several quite separate adult groups may be identified.

Native English adult speakers

A high proportion of the literature surveyed deals with the use of technology in promoting adult literacy among native English speaking Australians as, for instance, in apprenticeship and job training skills. Two case studies in this report (Chapters 4 and 7) focus on native English adult speakers.

Aboriginal adults

Aboriginal adults, particularly in non-urban communities, are another group for whom occasional broad educational projects are undertaken. Because these programs include wider aspects of literacy encompassing what was identified above as cultural and critical literacy, a description of how technology is used in these kinds of programs is included in this report (see Chapter 5, and especially Chapter 6).

Adults with disabilities

The field of special education has always taken advantage of technological developments in helping those with disabilities to communicate. Much of the literature pertains to the use of technology with younger subjects. To a lesser extent, technology is used to enable physically disabled adults to acquire literacy, thus empowering them to live richer lives. One case study (Chapter 8), for instance, details new technological tools for the blind.

Adults from non-English speaking backgrounds

The Australian population is changing markedly as a result of immigration policies which bring into the country increasing numbers from non-English speaking backgrounds. Consequently, here is a group for whom special educational provisions need to be made, and some quite innovative uses of technology designed to promote communication in the broadest sense have been developed for use by such adult learners. These uses are documented in another case study presented in Chapter 9.

What is educational technology?

In Dymock's (1982) comprehensive survey of adult literacy provision in Australia, there is no mention of any materials other than printed materials. Not one of the 179 literacy schemes reported using materials or equipment other than those traditionally used in education – blackboard, pencil and paper, books, roneoed worksheets. Similarly, in an examination of the literature on adult literacy programs which is reported in Chapter 3, documentation on the use of technology was generally found to be scanty or non-existent. It seems either that the use of a particular technology is considered so ordinary that it is not judged important enough to document, or that time and funding is insufficient both to apply technology in specific adult literacy projects and to publish findings. Another possibility is that the so-called *new technologies* did not become widely used in educational settings before 1983 (Anderson 1984) when Dymock completed his survey.

The term *new technologies* is commonly applied to those technologies ushered in by the microprocessor, and is thus frequently identified with computers. The ubiquitous microprocessor, found in most of today's tools, from telephones to cameras, from television receivers to photocopiers, certainly underpins much current educational technology, including book printing. But to the extent that all technologies are at some stage new, a more appropriate term is *computer-based technologies*.

The Australian Society of Educational Technology defines *educational technology* as:

> ... the design, application, evaluation and development of systems, methods and materials to improve the process of human learning (quoted in Steele 1986: 130).

Although not at variance with this definition, there is a certain attraction in the approach of the Report of the House of Representatives Standing Committee on Employment. Education and Training into *Choice and Technology in Learning* (1989) – hereafter referred to as the Brumby Report – which states:

> Technology is more than equipment; it also embraces the way in which equipment and materials are used and the learning experience provided (Brumby Report 1989: 13).

Adopting this wider view, educational technology would include the use of such tools as the familiar book, blackboard and overhead projector; it would include the use of radio, television, cassette and video recorders, and telephone, together with associated radio and television programs, audio and video tapes, and teleconferencing; and it would include the use of computers, satellite, and optical laser disc technologies, together with associated computer software, CD-ROM discs and videodiscs.

As in the definition of literacy that was arrived at, the approach to educational technology adopted in this report is a wide one: it includes what is commonly thought of as *low tech*, as well as *high tech*. The use of print itself is not specifically examined, except in so far as learning materials, software manuals or courseware that accompany specific equipment are print based. Finally, the focus throughout is on the use of technology to enhance learning, not on technology as an object of study.

Report overview

This first Chapter describes the aims and purposes of this report on the use of technology in literacy programs and projects for adults. It describes also the broad definition of literacy adopted for the purposes of this report and the wide compass of educational technology in use. There is a brief discussion of the extent of adult illiteracy in Australia and the nature of provisions for adults with literacy problems.

Chapter 2 develops a framework for evaluating the potential of technology which takes account of the main stakeholders in literacy programs: administrators, teachers, and adult learners. This framework is applied in six selected case studies (Chapters 4 to 9). Chapter 3 provides a general overview of how and where technology is being used in literacy projects around Australia and abroad. The focus in Chapter 10 is on computer programs or software appropriate to the needs of adult learners wanting to improve basic literacy skills, while Chapter 11 shows how a literacy tutor and adult student worked together to produce tailor-made software to meet individual needs. Finally, Chapter 12 attempts to look forward to certain emerging issues and challenging opportunities provided by exciting developments in technology.

2 Evaluating the Potential of Technology

Before embarking on an evaluation of the potential of technology in adult literacy learning, we needed a framework for evaluation, an objective tool for examining the range of technologies deployed in literacy teaching. Since there was no readily available framework, it was necessary to develop one. This Chapter describes the framework produced, and Chapters 4 to 9 show how the framework was applied in six separate case studies involving the innovative use of technology in helping adults acquire literacy skills.

A framework for evaluation

The generalised set of criteria that follow on succeeding pages are set forth in the form of questions – questions that administrators can or should ask about any technology, current or planned; questions that teachers can ask about the same technology; and questions that adult learners, too, can ask.

The questions are grouped under headings, these constituting the evaluation criteria. Not all the criteria will be appropriate in evaluating all technologies used in adult literacy learning, for the range of technologies is wide, embracing *low tech* to *high tech*, and generally including both equipment or hardware and associated learning materials or software. The questions beneath each criterion are designed to expand upon or give a flavour of the criterion in question. Again, not all questions will necessarily be appropriate for all technologies or for all learning situations, and they are best taken as a general guide. In all, there are 25 criteria, 7 for administrators, 12 for teachers, and 6 for adult learners.

Below each criterion and its associated questions is a rating scale. This scale, in the form of a semantic differential, is an attempt to encapsulate the tenor of the separate questions into a single index. Herein lies both the strength and the underlying weakness of such indexes. The criticism that may be directed to scales such as these is in attempting to confine a set of multifaceted questions to a single index. Each scale is assumed to be unidimensional. Yet how can complex human interrelationships be so limited, it may be asked? The counter argument to such a question is that often the only way to understand learning situations, initially at least, is to constrict the complexity by having a smaller number of variables. The rating scales are put forward, then, to be applied with judgment and care; accompanying other descriptive details, the scales may provide additional useful information.

Panel 2.1 contains questions that administrators might ask about technology in literacy programs; **Panel 2.2** the questions that teachers might ask of technology; and **Panel 2.3** the questions for adult learners to ask. We used these sets of questions and criteria in the six case studies that commence in Chapter 4, and found that they provided a framework for evaluating a wide range of technology from the points of view of the key groups of people engaged in the provision of literacy services.

Panel 2.1 Questions for administrators

Objectives

e.g. Are there clearly stated educational objectives?
Are the objectives important for schools and students?
(Circle one)
Rate **Objectives:** Important ← 7 6 5 4 3 2 1 → Not important

Outcomes

e.g. How does the technology compare with other equipment and materials?
Is there evidence that the technology is educationally effective?
Are there benefits for students and/or teachers?
(Circle one)
Rate **Outcomes:** Satisfactory ← 7 6 5 4 3 2 1 → Not satisfactory

Approach

e.g. Does the technology offer new approaches to teaching and/or learning?
Does the technology enable educational activities that other technology cannot?
Are teachers supportive about the approach adopted?
(Circle one)
Rate **Approach:** Supportive ← 7 6 5 4 3 2 1 → Not supportive

Access

e.g. Will the technology be useful for a wide range of students?
Is it intended that one student, a small group or a large group use the equipment?
Does the technology have the potential to be used by many students or only a few?
Will price and/or mode of use preclude students from utilising the technology?
Will some students be precluded from using the technology for cultural reasons?
Is special assistance necessary in order that all students have the opportunity to use the technology?
(Circle one)
Rate **Access:** Accessible ← 7 6 5 4 3 2 1 → Not accessible

Management

e.g. Does equipment have to be set up before students use it, or can students set it up themselves?
How time-consuming is it to set up any equipment or shut it down?
Are the services of a technician required, or can it be easily set up by students and teachers?
Does the equipment require a number of people or other resources for it to be used, or can it be easily used by an individual in a stand-alone form?
(Circle one)
Rate **Management:** Manageable ← 7 6 5 4 3 2 1 → Not manageable

Service/Support

e.g. What on-going support or servicing is there for the product?
Are there informed and appropriate specialist advisory staff to assist teachers if problems arise?
Will modifications of the product make current models obsolete?
Will updated versions or accompanying support materials be readily available?
(Circle one)
Rate **Service/Support:** Good ← 7 6 5 4 3 2 1 → Poor

Costs

e.g. Are costs primarily capital?
Are there extra costs in providing adequate and compatible hardware?
Are there accompanying learning materials to support the technology?
Are there personnel costs involved in using the technology?
Will there be training costs before the technology can be used effectively?
Are there going to be on-going costs for servicing?
Will there be on-going costs for materials/software?
Are there costs in the production and delivery of the technology?
Will there be any savings if the technology is used?
(Circle one)
Rate **Costs:** Reasonable ← 7 6 5 4 3 2 1 → Not reasonable

Panel 2.2 **Questions for teachers**

Objectives

e.g. Are the educational objectives clearly stated?
Is an objective that students' learning be facilitated using the technology?
Is an objective that students learn how to use the technology?
What are students expected to learn by using the technology?

(Circle one)

Rate Objectives: Important ← 7 6 5 4 3 2 1 → Not important

Outcomes

e.g. Is there evidence that the technology is effective in meeting its aims and objectives?
How will the technology be deployed to achieve its educational objectives?
What would teachers like to occur in using the technology?
Are other means of learning as effective as the 'new technology'?
Can existing tools or equipment achieve similar outcomes?

(Circle one)

Rate Outcomes: Satisfactory ← 7 6 5 4 3 2 1 → Not satisfactory

Approach

e.g. Does use of the technology reflect current thinking on language and the development of literacy?
Is the approach underlying the technology acceptable to teachers?
Are the technology and associated materials compatible with your approach to language and learning?

(Circle one)

Rate **Approach:** Compatible ← 7 6 5 4 3 2 1 → Not compatible

Interest level

e.g. Do teachers want to use the technology with their students?
Is the technology of high interest to students?

(Circle one)

Rate **Interest level:** High ← 7 6 5 4 3 2 1 → Low

Appropriateness

e.g. Are effective and appropriate teacher support materials available?
Does the technology allow students to make choices about their learning?
Does the technology become the teaching environment, or a tool within that environment?
Does the technology combine effectively with previous methods?
How appropriate is it for students to be using the technology at this time?
Does using the technology assist in achieving students' learning objectives?

(Circle one)

Rate **Appropriateness:** Appropriate ← 7 6 5 4 3 2 1 → Not appropriate

Flexibility

e.g. Can the technology be easily integrated into the classroom?
Can the technology be adapted for use with different levels or abilities of students?
Is the equipment best used on a one-to-one basis or with groups of students?
Does the technology have a wider application than that originally intended?
Can the technology be used with other equipment to extend its flexibility?
Is the approach flexible enough to allow adaptation?

(Circle one)

Rate Flexibility: Flexible ← 7 6 5 4 3 2 1 → Not flexible

Adaptability

e.g. Can the technology be used without modification?
When used by students, do equipment or materials need adaptation?
Can the educational content of learning materials be adapted by teachers?
Is the technology modifiable for different student needs?

(Circle one)

Rate **Adaptability:** Adaptable ← 7 6 5 4 3 2 1 → Not adaptable

Panel 2.2 continued

Learning

e.g. Does the technology allow students to interact with the material, to learn at their own pace, to learn at a time convenient to them, or to learn in a style that suits them?
Does the technology allow active learning or are students passive recipients?

(Circle one)

Rate **Learning:** Active ← 7 6 5 4 3 2 1 → Passive

Familiarity

e.g. Does the teacher need to be familiar with the technology in order for it to be used?
Do teachers feel sufficiently prepared to use the technology?
Can students use the technology without being totally familiar with it?

(Circle one)

Rate **Familiarity:** Familiar ← 7 6 5 4 3 2 1 → Not familiar

Portability

e.g. Can the equipment be readily transported according to the situation in which it is needed?
Could students use the equipment at home if it were made available for that purpose?
Does the equipment need a skilled technician to set it up, or can this be done by the teacher?

(Circle one)

Rate **Portability:** Readily portable ← 7 6 5 4 3 2 1 → Not readily portable

Convenience

e.g. Is it time consuming for students to gain access to the technology?
Does the technology have to be specially set up before a student can use it, or can students set it up themselves?

(Circle one)

Rate **Convenience:** Convenient ← 7 6 5 4 3 2 1 → Not convenient

Ease of use

e.g. Does the technology leave students or teachers feeling bewildered?
Have teachers received adequate preservice or inservice education in the use of the technology?
Does the technology require much time for it to be mastered?
Can the technology be effectively used without a complete understanding or mastery of it?
Does use of the technology need constant referral to documentation?

(Circle one)

Rate **Ease of use:** Simple ← 7 6 5 4 3 2 1 → Difficult

Panel 2.3 . **Questions for adult learners**

Expectations

e.g. What do students expect to learn by using the technology?
What would students like to happen when using the technology?
Do students expect their learning to be effective when using the technology?

(Circle one)
Rate **Learner's expectations:** High ← 7 6 5 4 3 2 1 → Low

Needs

e.g. Does using the technology assist students in achieving their learning objectives?
Does the technology allow a choice in the way students learn?
Do students prefer to use the technology on their own, or with a group of people, or both?
Are other means of learning better for students than the 'new technology'?
Does the technology provide an effective way for students to learn for their current needs?

(Circle one)
Rate **Learner's needs:** Met ← 7 6 5 4 3 2 1 → Not met

Feedback

e.g. Is the response time in interacting with the equipment acceptable?
Does the technology provide feedback to learners about their performance?

(Circle one)
Rate **Feedback:** Positive ← 7 6 5 4 3 2 1 → Negative

Interest level

e.g. Do students like learning using the technology?
Does the technology help students to want to learn more?
Do students find this way of learning more interesting than other ways?

(Circle one)
Rate **Interest level:** High ← 7 6 5 4 3 2 1 → Low

Learning

e.g. Does the technology allow students to interact with the material?
Does the technology allow learning at an individual pace?
Does the technology allow students to learn at a time convenient to them?
Does the technology allow for individual learning styles?

(Circle one)
Rate **Learning:** Active ← 7 6 5 4 3 2 1 → Passive

Ease of use

e.g. Does the technology leave students feeling bewildered at all?
Does the technology require much time for it to be mastered?
Can the technology be effectively used without a complete understanding or mastery of it?
Does the technology help students to learn how to use it?
Do students have to ask someone else to set up the technology, or can they set it up themselves?
Is the technology easy to use?

(Circle one)
Rate **Ease of use:** Simple ← 7 6 5 4 3 2 1 → Difficult

Applying the evaluation framework

The evaluation framework developed in this Chapter contains 25 criteria and associated rating scales, of which 7 relate to administrative concerns, 12 to concerns of teachers, and 6 to concerns of adult literacy learners. For convenience, these are listed below:

Questions for administrators

1	**Objectives**	Important	← 7	6	5	4	3	2	1 →	Not important
2	**Outcomes**	Satisfactory	← 7	6	5	4	3	2	1 →	Not satisfactory
3	**Approach**	Supportive	← 7	6	5	4	3	2	1 →	Not supportive
4	**Access**	Accessible	← 7	6	5	4	3	2	1 →	Not accessible
5	**Management**	Manageable	← 7	6	5	4	3	2	1 →	Not manageable
6	**Service/Support**	Good	← 7	6	5	4	3	2	1 →	Poor
7	**Costs**	Reasonable	← 7	6	5	4	3	2	1 →	Not reasonable

Questions for teachers

1	**Objectives**	Important	← 7	6	5	4	3	2	1 →	Not important
2	**Outcomes**	Satisfactory	← 7	6	5	4	3	2	1 →	Not satisfactory
3	**Approach**	Compatible	← 7	6	5	4	3	2	1 →	Not compatible
4	**Interest level**	High	← 7	6	5	4	3	2	1 →	Low
5	**Appropriateness**	Appropriate	← 7	6	5	4	3	2	1 →	Not appropriate
6	**Flexibility**	Flexible	← 7	6	5	4	3	2	1 →	Not flexible
7	**Adaptability**	Adaptable	← 7	6	5	4	3	2	1 →	Not adaptable
8	**Learning**	Active	← 7	6	5	4	3	2	1 →	Passive
9	**Familiarity**	Familiar	← 7	6	5	4	3	2	1 →	Not familiar
10	**Portability**	Readily portable	← 7	6	5	4	3	2	1 →	Not readily portable
11	**Convenience**	Convenient	← 7	6	5	4	3	2	1 →	Not convenient
12	**Ease of use**	Simple	← 7	6	5	4	3	2	1 →	Difficult

Questions for adult learners

1	**Expectations**	High	← 7	6	5	4	3	2	1 →	Low
2	**Needs**	Met	← 7	6	5	4	3	2	1 →	Not met
3	**Feedback**	Positive	← 7	6	5	4	3	2	1 →	Negative
4	**Interest level**	High	← 7	6	5	4	3	2	1 →	Low
5	**Learning**	Active	← 7	6	5	4	3	2	1 →	Passive
6	**Ease of use**	Simple	← 7	6	5	4	3	2	1 →	Difficult

In summary, the criteria – one group for administrators, another for teachers, and another for adult learners – and the associated rating scales, are designed to serve as a framework for evaluating the potential of different technologies. Where this framework has been found helpful is in having a generalised set of criteria that may readily be adapted and against which a range of different technologies in use in adult literacy learning may be evaluated.

As already indicated, not all these criteria will apply to all technologies and some modification may be required in some cases. The next Chapter reviews technology in use in adult literacy programs around Australia as well as certain overseas' developments and initiatives, while the chapters which follow contain case studies of six selected Australian literacy projects. The framework developed here was applied in evaluating the technologies described in the case studies.

3 Technology in Use in Adult Literacy Programs

The first phase of the project involved reviewing the literature both in Australia and overseas where technology was reported as being used in adult literacy programs. Where contact could be made with those using the technology, letters were sent to request any further documentation and to discover the current state of the project or program. This Chapter can only provide a selection of what is happening around Australia and overseas. The Chapter concludes with a brief examination of the main types of technology being used in literacy programs for adults.

What's happening in Australia

To find out what is happening in Australia, all state representatives of the Australian Council of Adult Literacy (ACAL) were approached requesting assistance with information and contacts for instances of technology being used to promote literacy among adults. At the same time a literature search using the Australian Education Index over the past five years was conducted. Other incidental information was gathered in conversation with those involved in developing educational technology.

A good response was obtained from the many people who have been involved in the use of technology in adult literacy who were approached for information or documentation, and a break-down of this information, by state, follows below. It was never intended that this should be a comprehensive survey. Rather, a selection needed to be made to avoid duplication, for many concurrent developments are in progress around the country. What we hope is that a flavour of how technology may be used in the provision of adult literacy programs can be gleaned from the cross-section of descriptions given. Some state representatives indicated that little in the way of technology was being used within their programs. Despite the broad approach to technology adopted in this survey, we wondered if such a response was a result of the notion of technology often being associated with computers. Our enquiries also revealed that while funds might have been available for project trials of different kinds of technology, once the trials were completed – and regardless of the outcome – more frequently than not little attempt was made to implement the use of the technology.

Queensland

Diverse uses of technology are documented from Queensland. Some have already been applied in adult literacy programs; others have the potential to be used for adults' literacy development. Quite often technology was used under trial conditions and, for whatever reason, was not continued. One such trial in 1986 was undertaken by the Queensland State Government private network service (Q-NET), which is an integration of satellite technology for multi-purpose communications (Gosewinckel 1986: 6). The trial provided fully interactive, high-quality, two-way voice communications between students and teacher through the Mt. Isa School of the Air, and one-way video from the teacher to the student; personal computers were used for data transmission. Students who participated in the trial, it is reported, became more motivated, diligent, and willing in their school work (Brumby Report 1989: 40). This type of distance learning delivery system also has the potential to be used for literacy teaching.

The Q-NET satellite technology was used again in 1987, when TAFE was offered the opportunity to undertake a weekly literacy broadcast during the day. However, due to a relatively small budget being granted, and a lack of expertise, only one program was completed. This was transmitted on June 17, 1987. Zimmerman (1987: 6) states that the aim of the program was to increase public awareness of the issue of adult literacy and to create a sense of belonging to a statewide movement for students and tutors. One aim was to involve the community by having people phone in at random – like talkback radio. The response to the program was positive, but a drawback was considered to be the cost involved in using this type of medium.

Long (1986: 11) writes positively about the benefits of satellite technology in terms of being distance-independent, its ability to cross traditional boundaries, to provide two-way communication, and distribute information at uniform cost to groups of learners whether far or near. These are considerations that need to be weighed carefully against the costs of production.

Another innovation that uses technology for adult literacy has been the establishment of Electronic Learning Centres (ELC) in different TAFE Colleges (Bowen 1986). The courses offered are usually short, and the centres are designed to operate on a drop-in basis. Two of the centres described by Bowen open for six days a week for an average of 12 hours a day. Students can enrol for computer-aided courses in basic literacy and numeracy skills. Bowen (1986: 42) argues that ELCs allow adults to learn at their own pace, and in their own time, as well as having the potential to provide high quality courses in places where there is no one with expertise in a given subject area. **Panel 3.1** describes the activities of the Electronic Learning Centre at Kangaroo Point College of TAFE in Brisbane. Testimony that ELCs do meet the needs of many adults seeking help is seen in the letter written on a word processor by a student at Kangaroo Point College (reproduced as it was written in **Panel 3.2**).

The development of adult literacy skills among disabled students (in particular, blind and visually impaired) is catered for at the Yeronga TAFE College in Queensland (Ruddy 1986). Equipment such as talking typewriters, and computers that can convert the contents of a screen into electronically spoken words through voice synthesizers enable students to access and use the most sophisticated business programs. The case study in Chapter 8 describes the equipment and procedures more fully.

New South Wales

In 1984, a simple but innovative program for providing adult literacy began in Armidale in New South Wales, using radio. Gilbert (1988) documented the process that is used to get a literacy program to air. The program called *Reading and Writing for Adults* is presented twice a week on 2 ARM-FM, Armidale's Community Radio. The thirty-minute program usually consists of a section on basic vocabulary, grammar and spelling. Vocabulary is increased by such techniques as listing words using a question and answer format, talking about opposites, plurals, and the masculine and feminine forms of words. This is followed by a section on reading. Material is taken from the *New Englander*, a newspaper distributed free to householders each week. The articles are read on air and then discussed, paragraph by paragraph. Unfamiliar words are noted, as well as spellings, punctuation and different ways of expression. Other reading material is also used, for example, Medicare forms, tax forms and guides, and application forms for a driver's licence or a library borrower's card. The telephone book and *junk* mail are also utilised for the learning process. Interviews with various community members are also incorporated into the program. The program is usually timed to allow for a musical break. While it is difficult to gauge the reaction of people in need of literacy support, a committed team in Armidale continues to provide a radio literacy program.

Panel 3.1

Catering for adult needs at an Electronic Learning Centre

The Electronic Learning Centre at Kangaroo Point College of TAFE allows students enrolled in the Computer Users' Workshop to have access to the computers and a variety of programs from introductory tutorial disks to learning packages for word processing, spreadsheets and databases. The students range from total beginners hoping to get into formal computer classes to students already enrolled in computer classes wanting to practise, to students working on assignments for other courses, to people who have no desire to enrol in anything formal but who still want to learn about computers. Those who choose to gain formal qualifications can enrol in the fleximode courses, study at their own pace, and then sit for an examination when ready.

Our Electronic Learning Centre also offers adult literacy and numeracy classes three times per week, two hours per session. This is to be increased to four sessions, two in the day and two evening sessions. Students enrol at any time during the year and can re-enrol on a semester basis. Students may come to as many sessions as they wish during the week. Often students can come only during the day, or only in the evening. Shift workers can attend as their schedules allow them. Some may be able to come once a week, or just for part of a session.

The courses are run entirely as individually based learning experiences. Students progress according to needs expressed, or diagnosed, at their own pace. Usually there is a specific goal and purpose such as further study. There are always two teachers available to make sure that students have adequate access to valuable teaching time. Since the students need to be fairly independent, we do not generally cater for those at the beginning stages of literacy. Although we have taken on a small number who are beginning readers, most students have more advanced levels of skills. A good proportion are students who have completed migrant courses but wish to improve their skills further.

Anita Steinerts
Kangaroo Point College of TAFE

A very new piece of equipment with application for reading and language acquisition is Lexiphon. Although Lexiphon has been under development at Macquarie University since 1986, it is as yet little known. The Lexiphon system (comprising both hardware and software) is an example of new generation educational technology that incorporates speech with text. The developer and inventor of Lexiphon, Dr Lloyd, is working in conjunction with the NSW Department of Technical and Further Education, and with the cooperation of the Speech, Language and Hearing Research Centre at Macquarie University, to explore the system's potential for literacy development. The case study in Chapter 7 describes Lexiphon in more detail.

Panel 3.2

A letter

I think this is an appropriate time to summarise my experiance in study. When I introduced my self to english study for the addults at Kangaroopoint college I never thought that those steps will change my life for the better. Not only that I have continioud my English education but I did enroled myself in to management course which happened to be very beneficial to me. In the short period of time I managed to improve myself and gain more confidence in my studies.

Naturally without the support of Annita, Marion and Nil, my good teachers, I would have never achieved my goals. My goals primerely talking about are: To improve my English in writing, reading and expressing myself to extent where Ican feel a total control over the language. My other goal is to achieve a better understanding of management the course that I began stadying in June 1989 and to pass my final examination test so I can continioue my study next year.

I know that with time I will improve my English. All I have to do is to press on with my education and make a step at the time. Itis a long road but nothig can be achieved without strugle.

A student at Kangaroo Point College

Victoria

In 1985 the Victorian TAFE Off-Campus Network (VTOCN) received funding from the Participation and Equity Program for an off-campus literacy project. The project tested models of distance literacy learning and examined whether off-campus literacy is a viable means of study for young adults (Stewart 1986: 5). Three programs were conducted over a 12-month period. Two programs offered adult literacy students a course of supported learning, using prepared study materials (printed booklets accompanied by audio tapes) with some individualised literacy activities. A survey of off-campus literacy materials was also undertaken. The survey included audio and video materials, radio and to a lesser extent television. Material examined, consisting of printed booklets accompanied by audio tapes, was reported to vary greatly in teaching strategies employed, as well as in style and presentation. The survey did not find any Australian materials prepared using video, nor any examples of radio being used as a direct teaching medium in adult literacy (Stewart 1986: 14). **Panel 3.3**, however, announces a more recent initiative where radio is used to address the problems of adults with literacy problems. How tape recorders can be used by students and tutors is described in **Panel 3.4**.

Panel 3.3

Adult literacy goes to air!

Castlemaine Literacy Group was approached by the Manager of the Goldfields Community Radio 3CCC, Gerry Pine, with a view to running a regular program dealing with Adult Literacy.

Literacy Matters finally went to air in early October 1988 and has continued as a half-hour, once a fortnight, program. It can be heard at 1 p.m. every second Thursday and covers a broad field. Some of the topics have been:

- Public awareness of literacy problems
- Provision of services for adults
- Student work
- Student comments on their experiences as literacy students
- Tutor experiences
- Language development
- How adults learn
- Diary keeping/Journal writing
- Literacy work with mildly intellectually disabled students
- Road Rules tuition
- International Literacy year information
- Advertising for Students/Tutors

Yvonne Brown

The Off-Campus Network project found that continuing support for students during the learning process is vital, and recommended that future programs develop appropriate support mechanisms. It also found that study materials were not always appropriate and were very scarce, and recommended that materials development be a priority (Stewart 1986: 39).

Another program involved adult literacy by teleconferencing. There were two aspects to the project in 1986; one was to train volunteer adult literacy tutors and the other was to work directly with adult literacy students. The training of volunteers took place in Gippsland, while the student-centred program was conducted through the Preston TAFE Off-Campus Centre in Melbourne. Since that time eleven adult distance literacy programs have been conducted and documented in a report by Jones (1987). Teleconferencing is a Telecom facility that allows up to ten parties to be connected by phone simultaneously, to link participants on a regular basis in support of their learning (Jones 1987: 3). Comments after the programs were completed indicated that the teleconferences were considered a valuable and efficient way of providing tutor education across large country regions. Concerns were raised about technical problems with the equipment, difficulty in finding experienced group tutors for the tutor education projects, and the cost of the programs. However, each of these concerns is addressed by Jones and none seems insurmountable. The cost of the programs, when compared with other traditional Victorian TAFE Off-Campus Network subjects, was found to compare favourably for a group of 78 students. They were even more favourable for programs involving smaller numbers of students (Jones 1987: 47). A case study of the use of DUCT teleconferencing for conducting literacy classes is presented in Chapter 5.

Panel 3.4

Using tape recorders

There are many ways that tape recorders can be used to advantage by adult literacy students and by literacy tutors.

For students:

- Beginners have the stories they generate read onto tape for them to read at home.
- Writing by other students can be read onto tape for them to read at home.
- Tutors read commercial publications onto tape for students to follow at home (e.g. short stories published by TAFE Publications Unit).
- Road Rules booklets are read onto tape, sometimes with additional questions and explanations, to help with applying for driving permits.
- Commercial publications, *Talking Books*, and tapes prepared by the ABC, make it possible for students to experience literature, to experience living in a story, without being bound by their limitations with text.

For tutors:

- Particularly for country people who often spend many hours on the road, and for city people driving in heavy traffic, tapes of workshops, lectures, talks on a variety of topics, offer staff development to tutors in an efficient and accessible form.

Aileen Treloar

The use of computers, and especially software for teaching literacy, has been documented by Rea, McKenzie, and Nicholls (1985). These authors conducted a survey into the type of computers being used, software used, and its suitability and effectiveness. Also documented was the development of a tool for strengthening reading skills at Latrobe University. Hardware was built to create a touch screen and to enable synthetic speech to be used. Sentences making up a simple story are created. Students identify words within the context of the story, then the word itself among distractors. A game follows (*Catch the Word*) in order to increase word recognition in a speeded realistic reading situation. A voice synthesizer is used to reinforce information given (Rea *et al.* 1985: 31). Essentially a drill and practice program developed for children, it nevertheless has implications for use with adults.

The Australian Capital Territory

As in other States, TAFE is responsible for much of the literacy provision for adults. The Individual Learning Centre at the ACT Institute of Technical and Further Education, for example, has a bank of computers which students use for word processing and other language activities. These activities include cloze reading exercises, speed reading, typing practice, grammar exercises, and vocabulary extension. **Panel 3.5** details some of the other ways technology is used at the Individual Learning Centre in Canberra.

Panel 3.5

Diverse uses of technology at an Individual Learning Centre

In addition to the bank of computers, technology is used in many other ways in the Individual Learning Centre (ILC).

There are dozens of articles and excerpts recorded on cassette tapes, and these are used as readalong exercises. We use videos as an aid to teaching aspects of literacy, ranging from spelling to letter and report writing. We have two Language Master machines, which are in almost constant use by our students. Our Secretarial students make good use of these machines to help them learn the 400 business-related words on their spelling lists.

We have boxes of slides used for vocabulary extension, and several packages involving the use of Language Master cards and cassette audio tapes together.

Our Electronic Mediaboard allows notes written up for a class to be photocopied and distributed. There are several calculators which are used by students in maths classes in the ILC.

Technology is a very important aid in our basic literacy programs. While all students benefit from it, some of them would have great difficulty attaining any level of literacy without it. This applies particularly to our intellectually disabled students who use all our equipment.

Christine O'Callaghan
ACT Institute of Technical and Further Education

Tasmania and the Northern Territory

In both Tasmania and the Northern Territory computers and other technology are being applied to producing learning materials. In Tasmania, computers are used to store and to prepare a variety of elementary reading material of high interest level to adults on high quality but low-cost master copies (see **Panel 3.6**). From the Northern Territory comes a report of how technology is helping in the production of literacy materials for bilingual learners in central Australia. Czerniejewski (1989) notes that just as computer-based technologies have revolutionised the printing industry, so these tools are changing the way literacy materials are produced. Aboriginal Literacy Workers have adapted quickly and easily, he says, to the new writing tools; and Aboriginal artists, experimenting with the new art tools (of the Macintosh microcomputer), have produced outstanding results.

Panel 3.6

Guidelines for producing adult learning materials statewide

- To centralise adult learning material production, statewide.
- To develop a scheme that provides a focus for identifying and developing appropriate adult learning materials in the areas of basic reading, maths and survival skills, where there are few commercial products.
- To provide an impetus and outlet for student writing.
- To establish a service producing material which is easy to read and use, cheap and simple to reproduce, and through the computer storage system to provide permanent and ready supply of high quality masters for the state.

Resources Development Unit
Devonport, Tasmania

South Australia

As part of a pilot program for Aboriginal education in remote areas of South Australia, a series of programs was produced by the Adelaide College of TAFE, to be transmitted by satellite through Imparja, the Aboriginal-owned television station in Alice Springs. The programs were designed to be interactive using DUCT teleconferencing and what is referred to as narrowcasting (Schick 1989a). This project exemplifies literacy provision in the broadest sense for cultural literacy, or enabling people to understand the cultural mores, includes watching television. The programs followed a broad outline of addressing issues related to community management, but the flexibility of the programming was such that, as student needs became apparent, these could be addressed too. The adults would gather together in a community hall in order to watch the program together. This facilitated interaction as they were watching the program, while the DUCT teleconferencing using press-to-talk microphones allowed interaction between the communities viewing the program (Amata, Indulkana, Oodnadatta, and Coober Pedy), and the presenters of the program who were in Adelaide. The case study in Chapter 6 presents further detail about this innovative project for isolated communities.

Interactive videodisc as a medium for literacy learning has been demonstrated to have considerable potential. *The Aussie Barbie* which was developed to enable English as a second language learners to learn *social contact* English has had a benefit in literacy, particularly for learners from languages with non-Roman scripts. Learners have the opportunity to participate in the conversations and, when they reach the point of interaction they see the text printed on the screen. If they are unable to decode it, they simply touch the screen and hear the question or the response. This means that they have rapid feedback on unknown words and can continue to interact with the program. As learners increase their understanding of English, they can make contextual guesses about the text's meaning, and receive immediate feedback as the guests at the barbecue respond. Interaction is facilitated by the videodisc being connected to a computer program. The interaction occurs through the use of a touch screen, which means that students using the program do not need to have any understanding of the technology to be able to use it. They simply touch the television screen over a word, icon or person for the program to respond appropriately (Schick 1988). Another case study (Chapter 9) describes this literacy tool for second language learners.

DUCT teleconferencing has been used as an integral part of TAFE provision of Aboriginal Education since a trial in 1985 called *Writing Better English* was conducted. Teleconference techniques were used to complement the specially prepared print materials. The use of the telephone-tutorials was chosen to provide teacher-student interaction, and to provide a means of developing oral literacy skills. Kirk (1986) states that the technology was found to break down many barriers experienced in face-to-face teaching of Aboriginals. Barriers such as shame and shyness due to eye-contact were removed. The need to verbalise all responses resulted in the better use of speech, enhanced listening skills and facilitated greater assertiveness and more questioning.

Yet another innovative use of technology described in greater detail in following chapters is computers that *talk* (see Chapters 8, 10 and 11). *Talking computers* are being used by blind students, providing them with a *window into the seeing world* and enabling them to work independently.

Western Australia

A number of organisations in Western Australia offer programs or projects in adult literacy (**Table 3.1**). To assist us in the present overview, Colleen Smith, a field officer with TAFE, made contact with each organisation asking them to specify what kinds of technology (both *high* and *low tech*) were being used in teaching and learning. In the case where groups were representative of a network of similar groups, contact was made with the largest of the groups. Her results, in Table 3.1, show the wide range of technology in use. Tape, video and photocopiers are clearly widely used, as also are computers and television. Less widely used are language laboratories and language masters.

Because of the size of Western Australia and the difficulty of providing literacy tuition for adults across the state, many people most in need of adult education classes do not have access due to their isolation. To try to meet this problem, a system of community volunteer tutor groups has been set up. Students and tutors may ring a toll-free number in Perth to make enquiries. This enables those seeking help to speak with adult literacy educators for assistance with problems they may have (Lynch 1987: 7).

Lynch (1987) also noted that plans were underway to investigate the use of teleconferencing, satellite television and School of the Air programs for adults, but no further documentation has yet been sighted about this work.

Mobile resource units have been developed in order to meet the needs of many small communities that lack access to learning resources. Hawke (1989) describes how these mobile resource units, equipped with books, teaching materials and games, calculators, tape recorders, even a lap-top computer and software, are available within a community until a group is established and has acquired its own resources, at which time the unit is removed to a new venue.

Table 3.1: *Technology used by organisations in Western Australia providing programs in adult literacy*

	Organisations with programs in adult literacy									
Technology used	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**
Calculator			√	√	√				√	
Camera				√	√	√			√	
Cassette duplicator	√			√	√	√				
Computer	√		√	√	√	√				√
Digital clock									√	
Facsimile machine				√						
Interactive video tapes	√									
Laminator	√			√						
Language laboratory	√				√					
Language master	√				√					
Lettering machine				√						
Overhead projector	√			√	√	√			√	
Photocopier	√		√	√	√	√	√	√	√	
Slide-sound carousel					√					
Telephone answering machine				√		√				
Teletypewriter										√
Television set	√	√			√	√			√	√
Typewriter – manual				√						
– electric				√					√	
– electronic			√	√	√	√		√		
Video camera		√	√		√				√	
Video player			√	√	√				√	√
Video tapes	√	√	√	√	√	√			√	√
Word processor			√							
16mm projector and film					√	√			√	

Notes:
a = Adult Migrant Education Service
b = Advanced English Language Program
c = TAFE Disabilities Unit
d = TAFE Adult Literacy Volunteer Tutor Scheme
e = TAFE Communication Skills Centres
f = SPELD
g = Community Group Mundaring Sharing
h = Good Samaritan Industries
i = Addwest Collier
j = Speech & Hearing Centre for the Deaf - Young Adult Deaf

What's happening overseas

The purpose of looking at what is happening overseas has been primarily to put the use of technology in adult literacy into a global perspective, rather than to make any detailed study. The examination of how technology is used for adult literacy teaching and learning has therefore been selective, in that we were already aware of types of technology in use, and focused on these in the literature review.

The United States

Examination of the literature shows that technology is being used in new and innovative ways to assist adults in becoming literate. Turner states that technology works with adult literacy students because it provides privacy, immediate feedback, individualisation, control and flexibility (Turner 1988: 643). In particular, word processors and databases are reported as providing a number of opportunities for meaningful literacy learning (Young and Irwin 1988: 649). However, the introduction of *HyperCard* by Apple for the Macintosh in 1987, has meant that computer horizons have been broadened.

HyperCard is being used as an authoring tool to produce programs for literacy teaching, as Giamo reports at Drexel University in Philadelphia. Instructional programs incorporate instructions that tell users how to operate the software, how to pronounce letters or vowel combinations and to practise what they are learning on specific lesson screens. Programs in development include *Alphabet for Adults*, *Vowel Combinations*, *Blank-It*, *Storyline* and *The MacStack* (Giamo 1988: 4-6).

The Learning Centre at Pennsylvania University has designed a word processor specifically for use with low-literate adults that is based on HyperCard (Penn State 1988). The word processor utilises synthesized speech to *talk* to the user. Learners can listen to what they have written at any time, and can receive spoken prompts whenever a button is clicked or a menu choice is made. Buttons are used initially instead of pull-down menus in this word processor for ease of use. As students progress, they can swap to the use of menus, which is the more familiar Macintosh interface. The word processor also includes a word bank containing 1000 high-frequency and *survival* words which learners can access as a reference tool.

Britain

The BBC has a history of commitment to educational opportunity and access, in recent years working in conjunction with The Open University and the National Campaign for adult literacy. An early initiative in this area was *On the Move*, a television series launched in 1975. It consisted of fifty 10-minute segments, using comedy sketches, animation, sight vocabulary, and real life stories. It appealed to the isolated adult non-reader and helped raise awareness of the problem of adult illiteracy within the general viewing audience. This series was followed by a second entitled *Your Move* comprising twenty 25-minute programs. A student workbook was available with lesson notes. This series was targeted at people who had some literacy skills. The aim of these two television programs was to show illiterates that they could learn to read and also where they might seek further help (McLauchlan 1984: 526). *Parosi* was a series aimed at Asian women at home who could speak little or no English at all. This series had twenty-six 15-minute segments and included a student handbook. Reactions to the series were mixed. A series on mathematics titled *It Figures*, dealing with metrication, used a panel of people to whom problems were posed. This series had ten 25-minute segments. *Write Away* was a series produced to assist adults with their writing and spelling skills. Teaching points included using abbreviations, keeping a list of often used words, and how to examine examples of writing. The strategies for remembering spelling included picture association, mnemonics, kinaesthetic feedback, and pronunciation. This series comprised twenty 10-minute programs. *Speak for Yourself*, also consisting of twenty 25-minute programs, attempted to help viewers improve their communication skills through drama. *Switch On* aims at confirming and reinforcing language, and is aimed at those who do not speak English as a first language. A student workbook in the student's first language and English is available too. This series consisted of ten 25-minute programs.

McLauchlan (1985), who undertook a study of broadcasting in adult literacy and continuing education programs, reported several criticisms about the medium, and raised a few questions, should a similar venture be undertaken in Australia. She suggested that Home Video Hire shops could be a better alternative in that students would be more in control. Students could decide whether or not to use the service, and to view programs when convenient. Any part of the video could be repeated as it was needed (self-paced learning). If the student wished to participate actively, lessons could be marked through the External Studies centre of the local TAFE college.

Canada

Other technology that also has the potential to be used with adult literacy students is live, interactive television. North Island College, located on Vancouver Island, off the west coast of British Columbia, has been providing telecourses since 1980 in conjunction with the Knowledge Network. All the telecourses are live, studio-based and low cost productions. The feature of these productions is the two-way interactive audio link allowing viewers to phone in with questions that go live to air (Kenworthy 1989: 7-8).

Overview of technology in use

The final section in this Chapter examines different types of technology that are used in literacy programs in more detail, without necessarily specifying the programs where each is being applied. Described first are what may be called traditional technologies – print, radio, television, telephone, audio and video tape, and computers. Next, certain *new generation technologies* are examined briefly.

Print media

Print continues to be the basis of every literate society, and consequently high importance is placed upon the ability to understand and use print effectively. As such, books, newspapers, pamphlets, forms, and signs are an integral part of literacy programs. Breaking the code enables learners to overcome the inadequacy they feel, and empowers them to act and take responsibility for their lives which is intrinsic to the philosophy propounded by Freire. As stated in the Brumby Report (1989: 15), "printed material is accessible, inexpensive, portable, easy to use and familiar" and so will continue to be predominant within literacy programs.

Audio material supporting print material

The use of audio tapes as an adjunct to learning became a natural extension of the popularity of cassette players within our society. As many people have ready access to cassette players, tapes are increasingly being used to support other learning materials, both for those adults who want to learn independently of a classroom situation, and for those for whom assistance in reading is needed. In these cases, the use of audio tapes facilitates learning. It is often claimed (for example, Schick 1989a: 2) that if more than one of the sensory perceptions is used in learning, then information will be more effectively learned than if only one sense is used. There are other advantages:

> tapes are inexpensive to purchase and the cost of making recordings is not high ... they have the additional advantage of being easy to post and able to be reused (Brumby Report 1989: 16).

Tapes also have the advantage of being able to improve communication, through the use of personal message tapes. These can be used to establish rapport and personalise interactions, and in the case of beginning literacy learners, can assist them in understanding written instructions, text, and written feedback about their work.

Radio

The use of radio to assist adults to become literate has been used in developing countries for many years. Among the advantages suggested of this communication medium are:

> it is relatively inexpensive, flexible, portable and almost every home has at least one radio, but probably more (Brumby Report 1989: 23).

Radio, however, needs to be used in conjunction with printed materials in order that the best use be made of the medium. Radio can be made interactive, for instance, by incorporating talk-back (using telephone). The Brumby Report also mentions that radio is particularly effective for attracting new students who otherwise might not enrol in literacy classes (1989: 25). Community radio stations in most states are involved in providing programs for the print handicapped. Generally volunteers read excerpts from the daily newspaper or from popular magazines; and special interest segments are programmed (Thurston 1988: 11). One radio program that was specifically produced for adults with literacy problems is described above in the section on New South Wales.

Video and television

The Open University in Britain, as detailed above, makes extensive use of the electronic media. However, the literature contains few references to the use of video material specifically produced in Australia to assist literacy students. One exception is a new venture where literacy providers in New South Wales are producing a series of videos to help adults learn reading and writing skills in their own homes (Persson 1989). The series is aimed at those people in the community who are unable, or unwilling, to use formal adult literacy education provisions. The videos are to be supported by workbooks, which will enable students to practise the skills and strategies introduced in the videos (Persson 1989: 8).

Subtitling

The use of subtitles has been used in television programming in Australia for a number of years as an aid for the hearing impaired.

> The Australian Caption Centre was established in 1981 specifically to use Teletext to provide subtitled television for hearing impaired people. Supertext Subtitles are prepared for a range of programs on the ABC, Channels 7, 9, and 10 to give hearing impaired viewers more equitable access to televised information (Salzer 1985: 9).

We wondered whether subtitling could not also be used to enhance the use of video material in assisting literacy students in their learning. However, we did not find any evidence from the literature of such an application.

Computers

Computers have had varied use within adult literacy programs. Research undertaken in 1986 by the TAFE National Centre for Research and Development found that the use of microcomputers in adult basic education had been limited by the lack of resources and teacher inservice training (Wilson and Hooper 1986: 3). While a great deal could be written about the use of computers generally, we felt that for the purposes of this report it would be most useful to discuss the use of computers in terms of software applications, and in terms of the peripherals or other devices that can be used in conjunction with computers. Both these uses are touched on here, and taken up further in certain of the case studies in following chapters and in Chapter 10 specifically.

One classification of computer software is to divide programs into two categories: computer-driven, typified by drill and practice and tutorials, and student-driven, exemplified by databases, simulations, certain educational games, and word processing. In an investigation of software suitable for adult basic education centres, Laidlaw (1987) suggested that computer software could be used for the following tasks: creative writing, word and text manipulation, games and drills, tutorial programs and simulation programs. What follows is a brief note on these main types of software for use by adults in acquiring reading and writing skills.

Drill and practice

Drill and practice programs have one advantage – they can assist both students and teachers to become familiar with computers. This type of program can also usefully provide students with an environment where they can practise as much and as long as they want. Drill and practice programs can usefully supplement instruction. If the drill is incorporated into a game, this can often increase motivation and interest. Tutorial programs which use both drill and practice, and also give explanations, are beneficial in allowing students to work at a pace that is suitable for them. If the student makes a lot of mistakes for example, the program can loop back to an easier stage.

Simulation programs

Any learning that takes place should ideally generalise beyond the immediate task and the classroom into the wider community. What simulation programs offer students is the opportunity to examine some aspect of the real world under controlled conditions (Anderson 1984). On the computer, students can make decisions, attempt to solve problems, and check results in a safe environment.

Word processing

Using a word processor, students build upon natural connections between reading, writing and thinking (Young and Irwin 1988: 649). The student can capture thoughts without concern for spelling or grammatical errors since they are easily corrected later. Spelling checkers are usually available for most word processing packages today.

Desktop publishing programs that combine graphics with text can also be the means to motivate students as they are able to see how exciting their work can look without their necessarily having a great deal of expertise.

The conclusion reached by Wilson and Hooper (1986) in their survey was that word processing packages were sufficient reason for all adult literacy programs to use computers as a resource for new adult learners. Word processors, they felt, could change reluctant learners' attitudes to writing. The ease of editing and the *error control* were major advantages.

Word and text manipulation

Laidlaw comments that students often feel *trapped* if they are unable to make sense of print. He continues:

> any program that involves manipulating text, guessing, searching, rearranging, pulling words apart and putting them back again, increases [students'] self-confidence and their own power over words (Laidlaw 1987: 7).

He recommends programs that allow students to work with words, whether it is their own words or the words selected by the teacher. These programs, he believes, empower learners and enable them to better make sense of their environment.

Story programs

Interactive story programs can help students to write stories, by providing clues or suggestions, or the beginnings of story lines which they can then complete. Reluctant writers' confidence increases and they are encouraged to write more (Laidlaw 1987: 6).

Shell programs

Shell programs are so called because they enable teachers to insert particular content into a program shell thereby customising the program. Students can then use these shells in their learning with the result that the student's learning is tailor-made and individualised.

Databases

Databases are possibly the most widely used application in the business world – for organising and locating information easily. Hancock (1989) describes how Australian teachers, at all levels, are introducing computer databases and the variety of ways these are being used. She describes also the way that students can develop their own databases to facilitate their learning.

Computer peripherals

There are a number of devices and attachments, commonly called peripherals, which linked to the computer can extend its capabilities in different ways. Described here are light pens, touch sensitive screens, and various speech cards and circuits, all of which may be applied in literacy teaching or learning.

The light pen is a pencil-like device that contains a light-sensitive diode at one end, and has a cable connected to a special input connector on the computer at the other. To operate a light pen the pen is touched against the monitor screen. This activates a switch and the position of the pen on the screen is computed. The light pen detects the passing of the beam and, since the start time for that refresh cycle is known, the position of the pen on the keyboard can be recalculated. Light pens, like all non-keyboard input devices, require special software. Light pen software provides screen areas which the user may touch with the pen in order to indicate 'yes', 'no', 'next item', and so on (Cox 1986: 9-10). The light pen has considerable potential for use particularly with students with disabilities, as research at the Australian National University has shown (Lally and Macleod 1983).

Some computer systems incorporate the use of touch sensitive monitor screens. Using a finger, the user touches a dialogue area on the monitor screen (e.g. 'help', 'yes', 'next') which is then acted upon by the computer. Early touch sensitive screens operated by detecting the break in an infra-red beam directly in front of the screen. Several beams were used in both the horizontal and vertical planes in order to detect the screen position of the user's finger accurately (Cox 1986: 10). However, developments in membrane technology have allowed the true *touch* screen to develop. These developments allow the fitting of a layered resistive membrane over the front of almost any monitor giving the facility of touch screen in almost any technical environment (Schick 1988: 7). The resistive membrane touch screen makes using *The Aussie Barbie* videodisc quite transparent, so that the technology can be used by students without any previous experience or exposure to computers (see Chapter 9). A touch screen has also been used in the development of software for enhancing reading skills at Latrobe University.

With the advent of integrated circuits for speech synthesis, it is possible to convert computer-stored text to audible form. Speech synthesisers take strings of characters, analyse them into phonetic elements and then output the phonetic elements as pre-programmed voice sounds. Although early speech synthesisers sounded mechanical and lacked inflection and realistic timbre, improvements in both phonetic analysis of words and in the production of speech sounds have greatly improved the performance of these devices (Cox 1986: 16-17). This has led to the development of the talking computer for visually impaired students, so that the text on the screen can be read back to them. It is also being used, as already noted in this Chapter, in conjunction with a word processor for use by low-literate adult students. Digitised speech, in contrast to synthetic speech, involves the storing of real speech on computer disk or compact disc (see Chapter 10 for a fuller discussion).

Much more difficult than speech synthesis or digitised speech is speech recognition although limited input devices are now available in the form of a plug-in card and software. The devices may be 'trained' to recognise about a thousand words. When using these devices, it is necessary to speak slowly to obtain reliable operation.

Teleconferencing

Technological advances have made it easier for one-to-one communications to be replaced by teleconferencing (see **Panel 3.7**). Telephones may be used to link three or more people in several locations. Expansion of telephone conferencing has occurred particularly in South Australia, where a loud speaking telephone with multiple microphones, called DUCT (Diverse Use of Communications Technology) has been developed. This system was developed by the Educational Technology Centre of the Education Department of South Australia. The first component of the system took the form of a terminal plugged into a normal telephone socket and power supply. The terminal provides up to six microphone inputs and an amplification system. It is connected to a loud speaker which is voice switched and is capable of being heard in a classroom of 30 students (Dunnett 1986: 30). The Brumby Report (1989: 35) states that:

> DUCT is cheaper to purchase than the terminal marketed by Telecom and is more suited to educational applications.

The Yallourn College of TAFE in Victoria has used teleconferencing to work with Distance Literacy Tutors. Teleconferences involved a small group at Yallourn College with microphones and a loud speaker phone and up to nine *legs* with individuals on conventional hand phones (Waterhouse 1987: 5). This type of multiple connection is possible through a Telecom-owned device known as a *conference bridge* and is referred to as a Telecom Operator Assisted Call. In conjunction with teleconferencing, other peripheral devices can also be used to provide printed, graphic, or visual material. The most common of these are telex machines and facsimile transceivers. Computers can also be linked in to enhance audio teleconferencing (Dean and Hosie 1985: 342). It has been found that teleconferencing works best when interaction is encouraged rather than using a lecture style method.

Panel 3.7

Teleconferencing – useful for adult learners and inservice education

Telephones are a nineteenth century invention which are still under utilised. When used for teleconferencing, small groups of students, or individual students, can be collected into a larger group. In Victoria, teleconferencing has been used to provide students with 1:1 tuition with the experience of being in a group. This is appropriate in both urban and rural areas because it overcomes the reluctance experienced by shy students – and by those who wish to preserve confidentiality.

For tutor education, it gives options of initial and inservice training over large areas of the state. For example, a training session has been conducted from Cohuna, on the River Murray, which included participants from as far away as Portarlington on the South Coast.

Aileen Treloar

New generation technologies

So rapid is the pace of technological development that new breakthroughs are being made constantly. Some of these developments, referred to here as *new generation technologies*, are already being applied to education. The Chapter concludes with a brief examination of their potential, particularly those which might have an application to literacy teaching.

Optical laser discs

The most widely available forms of laser optical disc are the audio compact disc and the videodisc. Not only do these have almost all the advantages of audio and video tapes, but they produce a much higher quality sound or image, they have a greater capacity to store information, they have a longer life, and they allow the user much easier random access to the material (Brumby Report 1989: 18).

CD-ROM

The features of optical laser discs make them technically superior to floppy discs and magnetic tape used in computer storage and retrieval systems. Data is therefore increasingly being stored on CD-ROM (compact disc read-only memory) discs.

CD-ROM drives are another peripheral that may be connected to a personal computer. The CD-ROM discs hold vast amounts of data, usually in the form of text files or numerical data. Recently, they have also been able to store digitised photographs and compressed audio. A single CD-ROM disc can hold about 600 megabytes of information, that is twenty times the amount of data that can be held on the average hard disk of a personal computer. Their mass storage capabilities, and the ease with which the data held can be manipulated, mean that CD-ROMs have tremendous potential in learning (Brumby Report 1989: 19).

Videodisc

Although videodisc has been available for many years now, the applications with computers in education are quite new. This form of optical laser disc technology is able to hold all types of media: film, video, slides, graphics, audio and computer data. However, the greatest potential of videodisc as a learning tool is when it is computer-controlled. Under the control of a computer, the user is able to interact more effectively with the material. Access is almost immediate, and continuity of the motion sequences no longer needs to be analogic, as different choices can be made and controlled by the computer. This can occur because each frame is given a particular *address* which the laser reading head simply reads, and then locates.

Hypermedia

Reference has already been made above to *HyperCard*, a new programming environment for the Apple Macintosh. HyperCard allows an almost unlimited number of items of information (up to the memory capacity of one's computer) to be linked together. Users may then browse or navigate through this information by pressing *buttons*. HyperCard can also link various forms of media, giving rise to the term *hypermedia*. Thus information in the form of words, charts, pictures, or digitised photographs may be stored on cards and linked to synthetic or digitised speech, the contents of a CD-ROM, and the myriad of images and sounds stored on videodisc. Through hypermedia, one is thus able to access a vast quantity of information in much the same way that one thinks, in a non-linear fashion (Fleischman and Bixler 1988: 15).

Case studies of technology in use

This Chapter has presented an overview of technology in use in adult literacy programs, both in Australia and overseas. The choice of programs and projects to include has necessarily been selective and can only give a flavour of current developments in the field.

The chapters which follow (Chapters 4-9) present more detail of selected developments in Australia where innovative technology is being used in adult literacy programs. These chapters take the form of case studies. In selecting which technologies to examine in greater detail, consideration was taken of the different groups identified in Chapter 1 (native English adult speakers, Aboriginal adults, adults with disabilities, and adults from non-English speaking backgrounds) for whom literacy provisions need to be made. In the pages which follow, six separate case studies focus respectively on computers as tools for all adults, teleconferencing as a means of reaching isolated communities, narrowcast television for targeting Aboriginal communities, the Lexiphon system as used in trade training, talking computers for the blind, and interactive videodisc as a tool for ESL learners.

Two further chapters (Chapters 10 and 11) focus more directly on the use of computers and computer software suitable for adult learners.

4 CASE STUDY:

Computers as Tools in Literacy Acquisition

Background to case study

This first case study focuses on the use of computers as tools in literacy acquisition in one TAFE College in South Australia. The Gilles Plains College was selected because its Adult Literacy Unit (ALU) uses computers quite extensively to support the acquisition of literacy skills for adults. This study set out to record and evaluate this application of computers, from the teacher's, administrator's and students' points of view, and to estimate the potential of computer based technologies in adult literacy programs. The criteria for evaluating the potential of technology, developed in Chapter 2, provided the framework for the ideas, reflections and judgements made in this case study.

What the literature says about computer-based learning

Much has been written about the efficacy of computers in the education process (e.g. Franklin 1988, Thompson, 1988). Robyler, Castine and King (1988) provide a comprehensive review of educational computing research, and conclude that computer applications seem capable of yielding educationally significant results. However, they argue that in reading, the research suggests that computer applications should be more effective in teaching lower level word analysis skills and least effective in teaching higher level comprehension skills. These authors also concluded that large scale use of a computer system for basic skills development will not be as *cost effective* as non-computer uses such as peer tutoring. They suggest that courseware designed specifically for the needs of the target students will help to address this problem.

Strickland, Feeley and Wepner (1987), while expressing excitement and hope for the potential of computers, particularly with the advent of *new generation* technologies, sound a word of warning for the way some programs are used. Drill and practice programs, they argue, do not warrant the large blocks of time they appear to be given. Many writers (e.g. Wray and Medwell 1989, McClurg and Kasakow 1989) highlight the educational virtues of word processors.

Pea and Kurland (1987) report on the explosion of word processing programs and the new wave of online writing support programs, such as spelling checkers and thesaurus generators, developed to work with word processors. They argue that these are still *slave technologies* and that we need to go beyond an emphasis on what computers can do and concentrate on what the developing writer knows about writing. Current tools, Pea and Kurland argue, are useful for improving the productivity and appearance of writing, but new writing technologies are needed which are multi-layered and flexibly responsive to a user's current writing skills.

> Novice writers' diverse problems with different components of the writing process imply that the use of expert writing tools by the novice – what we see today – is not in itself likely to improve the novice's writing. Different entry level tools may be required to bring children and adult novices to the skill level where they can maximally benefit from the cognitive writing technologies utilised by experts. (Pea and Kurland 1987: 297-298)

Dudley-Marling and Searle (1989) commented on the rapid increase in availability of computer assisted instruction (CAI) software for teaching oral language skills. They argue that this type of computer software is not effective in language development because it conflicts with the underlying principles of how language is learned. Further, Maddux (1989) suggested that, rather than having a preoccupation with hardware, educators should make software their major concern:

> We should demand efficacy research from firms who develop software packages and advertise them as efficient solutions to various educational problems (Maddux 1989: 28).

It is probable the debate over the educational value of computers will be redefined by the new generation software that is emerging. For the adult literacy student, however, there is little debate. Adult literacy students have reacted very positively to the use of computers in their literacy courses.

> Technology works with adult literacy students because it provides privacy, immediate feedback, individualisation, control and flexibility (Turner 1988: 643).

According to Turner, adult learners do not want others to know about their reading problems – they prefer the privacy of self directed learning projects and non-human media. The computer offers the sort of flexibility in programming and timetabling of instruction which are essential to keep adults, with many other commitments, on task as often as needed. Certainly in terms of the goals of "improved functioning in job, family, educational, social and religious contexts" (Perin 1988), adults seem to affirm that the technology was working for them (Turner 1988). Educators find that computers allow people and materials to be stretched further, according to Lane (1988), in the sense that the teacher is free to work with those specifically in need. Learning can be made more relevant to the learner's knowledge and linked to other aspects of their lives.

How the study was conducted

An initial meeting was arranged with the adult literacy teacher at Gilles Plains TAFE, Don Strempl, who was keen to assist with the study and very generously offered access to those involved in his program. Also working at the ALU, sharing her time between Adelaide TAFE and the ALU, is Jacquie Parslow. Strempl and Parslow have created a unit where students may work with computers for personal, and work related reasons. Unfortunately, because of time and other constraints, Parslow was not involved in this case study.

Examining the technologies

All hardware and software was detailed. Particular emphasis was placed on the most commonly used machines and programs. Because of the huge range of software at the Adult Literacy Unit, a decision was made to detail a few programs that were representative of the following types of software: Drill and Practice, Word Processing, Shell/Word and Text Manipulation, and Story/Adventure programs. A further aim was to describe and evaluate *new generation* applications: HyperCard stacks and software with speech. Chapter 10 of this report focuses more on the software in use at the ALU and therefore this case study does not include specific details on these various types of computer programs.

Observations

Ten visits were made to the Adult Literacy Unit, on Monday and Tuesday evenings, from 7.00 pm. to 9.30 pm. A number of tasks was undertaken during these visits.

Through naturalistic observation, a profile was developed of just how adult literacy provision is carried out at the ALU. Further informal information on students was gathered, while providing instructional assistance whenever it was required. Students, working on computer programs, told us how particular software stood up to a range of users. During the fifth visit, a student was selected by the teacher to work with the research team and trial a HyperCard stack incorporating speech (see Chapter 11 for detail).

Photographs were taken to demonstrate the technologies, the way they were used, and the physical features of the learning environment.

Interviews

Don Strempl, the adult literacy teacher at Gilles Plains TAFE, was interviewed to provide a teacher's perspective on the use of technologies in adult literacy learning. For an administrator's view, Dr Brian Nussey, Head of the School of General Studies at the College, was interviewed. Finally, students' opinions on the use of computers were canvassed; five students individually, and groups of students informally.

Because of the nature of the learners involved, the interviews tended to be quite short, only about 15 minutes each, and the evaluation criteria sheet was completed by us after the interview. This is a weakness in the procedure. However, it was thought that the actual ratings were the least important part of the data gathering exercise. We were more concerned with the students' perceived benefits and any difficulties they may have encountered.

Recent history of the Adult Literacy Unit

Do you have any computers? was the first question Don Strempl asked, before he started teaching at the ALU in 1984. At that time there was one Apple // computer and an expectation that more machines would be acquired as a need evolved. As Strempl recalls:

> *Back in '84 there was not much talk about getting computers talking and scanning. It was all pretty basic – there was an Apple // and things built up because there were educational programs available in maths, vocab and spelling.*

Indeed, the computer-based technologies have built up considerably at the ALU, to the point where there is now a range of ten different computers in the unit, supported by over two hundred computer programs. The emphasis has been on providing diversity for learners. At the ALU, classes are small: under ten students at a session. The ALU also provides for English as a Second Language (ESL) students and offers a bridging course into Community Access programs.

Negotiating learning objectives

There are clear objectives negotiated between teacher and student at the ALU. Before a student begins work at the unit, an interview is arranged with the teacher. At this interview, what the student wants to achieve is established. For example, a student may want to gain entry into the Police Force, or seek a job promotion which is dependent on improvement in maths skills, or be able write letters to an overseas friend. Whatever the objective, it is redefined into an achievable goal, and then ways of achieving this goal are negotiated.

Negotiations are not just based on *what* has to be done but also on *how* it will be done. The student has a choice of learning medium at the ALU. "Do you want to work from books, kits, your work related materials, computers?" is a question students are asked to consider. Many students choose the computer as one of the tools they will use to achieve their goals.

A session at the Adult Literacy Unit

During a session at the ALU one may see students working in many different ways. After one visit to the unit, the following diary notes were made:

> *The ALU is divided into two student work areas. The entrance area has a large table, tea and coffee facilities, shelves of books and kits, and two computer setups. The other area is ringed with computers around the walls and has individual student desks arranged informally in the middle of the room.*
>
> *There are seven students working here tonight. They have arrived over a period of twenty minutes, some straight from work. Most of them have tasks to go on with, and Don has spent some time reviewing work with individuals and managing the use of materials. Looking around the unit, we see two students standing by the coffee machine, browsing through some holiday photos and swapping stories. They will soon move on to their tasks. Meanwhile in the same room, at the IBM computer, a non-reader is working on Road Law. This student is responding to graphically presented road intersection problems; at fifty-one years old, one of his objectives is to learn to drive.*
>
> *In the other area, at a Macintosh computer, a student is using MacWrite to complete an essay. This student is typing from her handwritten, edited, manuscript. The essay is on the Australian Aborigines and has been researched and written out of interest, for her own satisfaction, not for any study requirements. She has, with the help of the teacher, saved her work from a previous occasion and has loaded it tonight in order to complete it. Some on-screen editing has already been done. When the essay is completed, it will be printed and checked for reworking, with the aid of the teacher. However, throughout this session, Don Strempl has been able to help with any queries, particularly in making sense of the handwritten text and correcting spelling.*
>
> *A few metres away on the NEC computer, a student is working through Lex, Wizard of Words. While using this adventure program, the student occasionally dives into a pile of dictionaries and thesauruses next to the computer, selects an appropriate one and responds to the computer problem. Now and again other students become involved in his efforts, and word suggestions and predictions will flow, in a manner typical of healthy learning environments.*
>
> *Two students on the Apple IIe are trying to unravel the mysteries of Where in Europe is Carmen San Diego? This adventure game, has at times made them scratch their heads and revisit the user's manual. They have, however, uncovered some clues on the elusive criminal, by retrieving information from the computer, and from the accompanying*

atlas, and they have established some thinking strategies for using the information they encounter. By talking to each other about the messages they are receiving, and by asking for help from Don Strempl, they have succeeded in making some sense of the on-screen situation. After about half an hour, they needed a break from this program. However, the discussions, over coffee, were influenced by their recent experience on the computer.

On an Apple clone, a student works through Fractions, a drill and practice program. He has a picture framing business, and wants to improve his maths skills, particularly fractions and decimals, as it is important to his work skills.

This is a brief snap shot of a period during the session. Throughout the session some students moved from computer to pen and paper, while others worked on different programs. There was never the expectation that because the machines were there, they had to be used. In fact, there were also many times, at other sessions, when most of the students were seated at tables working with pen and paper and referring to texts. But they had a choice, an opportunity to make the decision about how they wanted to learn at that session. **Figure 4.1** shows students working at the ALU on computers and pen and paper. Students were free to spend the whole session or as many sessions as they wished on an appropriate computer program. However, it was rare for a student to spend the whole session on the computer.

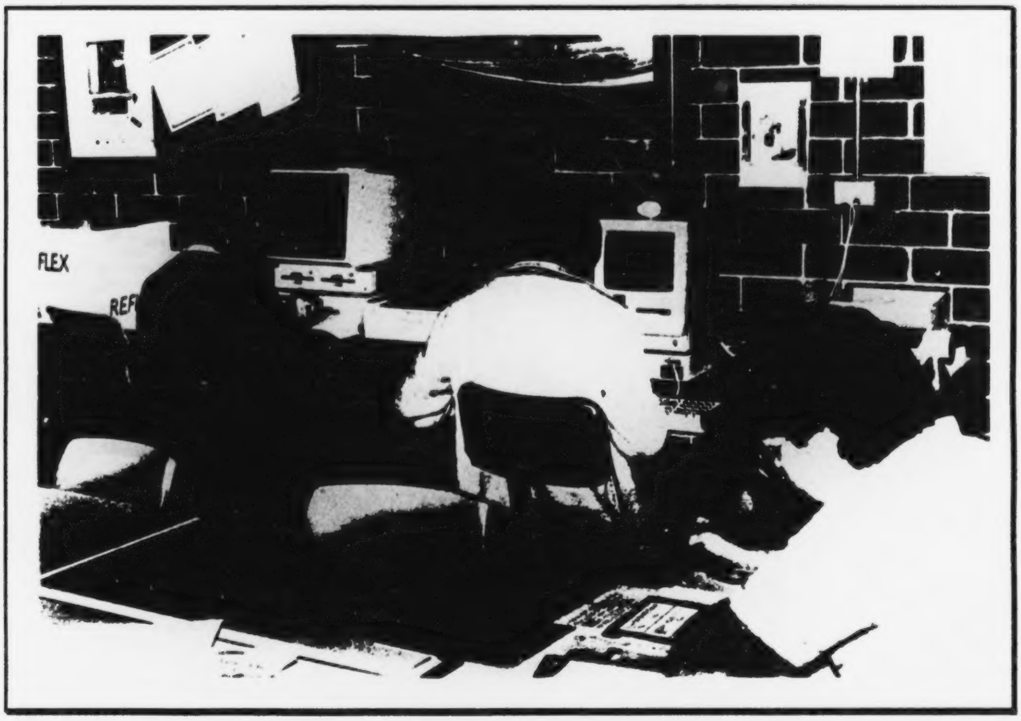


Figure 4.1: *Adult students at the ALU using computers as a part of their learning experience*

From the students' point of view

In evaluating the use of computers from the student's point of view, special considerations were made to attempt to overcome the difficulties low literate students would have in conceptualising the criteria questions. Initially, student responses were canvassed informally, over a number of visits to the ALU. For the students participating in interviews, a simplified set of questions was explained orally. However, because the responses were mostly very brief, what follows below is a synthesis of the general student responses.

Putting the students' views in terms of the *Evaluation Criteria* (Chapter 2), **Table 4.1** summarises our impressions of the way students rated each criterion. On the seven-point rating scale, seven is the most favourable response to each criterion.

Table 4.1: *Student ratings of computers on six criteria*

Criteria	Rating
Expectations	6
Needs	5
Feedback	5
Interest level	7
Learning	6
Ease of use	6

It is evident from these ratings that the use of computers was viewed very favourably at the ALU.

Expectations

Students clearly expected to learn by using computers. John, a fifty-one year-old student, felt that by using a computer he would become better at reading. John began at the ALU because he *wanted to go to school to learn to read and write*. Throughout his childhood, John, an eldest child, had to stay home and look after his brothers and sisters, and consequently never went to school.

When he started at the ALU, John could not read a word. His confidence and skills in reading have improved, to the extent that he made the following comment in terms of how working at the ALU and using computers had helped him:

> *Couldn't read at all but I can read a fair bit now ... I'm reading the paper now. Buy the paper on Satde ... look up the land prices.*

The expectation is that, through the use of computers, the improvement will continue and the confidence will grow. When asked about how long he expects to continue coming to the ALU, John replied: *Come in as long as I can, don't want to go back to me old ways!*

Needs

Pina's comments reflect the very positive student attitudes to the way computers provide learners with new ways of satisfying their needs. In 1988, Pina was a bright, bubbly teachers' aide at an Adelaide primary school. During the year she was involved in a car accident and as a result has damaged some brain scanning and organising functions.

> *Word processing is great because I know what I want to write but I can't put things together like I could before ... I'm OK as long as I don't have to explain things. Adventure games are helping me with retrieving; I need lots of practice ...*

Pina has found that computers provide an alternative to learning, for reasons which are, perhaps, an insight into problems that low literate students face in a normal whole class situation:

> *Because of this language problem, I wouldn't be able to manage going into an ordinary class, it all gets jumbled. In a situation with lots of information, I can't cope, I have difficulty. But with a computer I can just walk away from the machine and come back later!*

Feedback and interest level

The general response to the question of feedback was quite positive. One student, Kym, thought that some software could give a better idea of what the correct answer is, rather than *asking you to keep on trying again* without any clues. He said he often forgot what the task was and it would be easier for him if he could see an example whenever he needed to. Comments by Tracy summarize the very positive response to whether students find learning with computers more interesting than using traditional technologies. Tracy, a young lady, has been coming to the ALU for a number of years. But as a schoolgirl, she could not wait to leave school.

> *School was the pits, I was stuck in the opportunity class. It was boring ... I couldn't sit down with a piece of paper and study; it was no challenge at school. Computers have made a lot of difference to me. They're good 'cos you don't put pen to paper; my handwriting is bad. Computers are exciting.*

Tracy concluded by pointing to the fact that computers offer learning choice, something in her opinion, students in the *high school opportunity class* seem to miss out on.

Learning and ease of use

Students responded to questions relating to ease of use in a very positive manner. The most common response was that most programs were easy to use, and the overall impressions were that the more practice one had, the easier it was to use programs. Comments were particularly positive regarding the use of graphics as a means of understanding the task. A number of programs using synthetic speech (see Chapters 10 and 11) have been used at the unit recently. Students felt that synthesised speech was very good and it helped them, but mention was made of the difficulties in hearing and understanding some speech. **Figure 4.2** shows an adult literacy student using a program with synthetic speech.

When considering aspects of learning such as whether computers allow for interaction or operation at an individual pace, students again rated this criterion very highly. Comments were made, particularly about the way computers *let you work as fast or as slow as you like*. The social aspect of computer use came to the fore with comments about working together to solve word puzzles or adventure games.

Perhaps Andrew, a proprietor of an Adelaide Hills business, sums up another perspective on computers and learning. Andrew had good reason to work on his literacy problem:

> *I was backward and there were things I couldn't do ... I asked myself why didn't I do it years ago? ... I never really got a lot out of school because I didn't want to learn – what's the purpose? Now I'm in a business I thought I'd better bog down; now I've got heaps of purpose. I want to be more flexible in the business whereas now I'm somewhat restricted; I can't get behind the counters.*

Andrew has not spent much time at all on computers, although he has been at the ALU for a year. He has chosen to work mainly from books. His comments, however, have all been very much in line with those of the other interviewees. He concluded the interview with this comment:

> *Computers are good but I really haven't done that much with them ... I'm getting a lot out of what I'm doing so far. Why change a successful action?*

Figure 4.2: *John, a non reader, is using a synthetic speech enhanced program. To his left is part of an Echo GP speech system.*

From the teacher's point of view

Don Strempl has taught at the ALU for five years, and in this time he has established the Unit's wide range of computer hardware and software as well as reinforcing his own beliefs on how computers can assist in adult literacy learning. Strempl feels that most literacy teachers in South Australia use computers:

> *They haven't got the diversity of machines or programs that we have; we've got the widest range of gear in the Adult Literacy field. I feel we're getting a lot of help out of using computers. It's just a matter of making best use of them; to be able to individualise the program and find appropriate activities for students.*

Table 4.2 below records Strempl's ratings of the criteria questions for teachers, based on a seven-point scale, where seven represents the most favourable rating. Clearly, Strempl felt that through the use of computers, students can be provided with appropriate, interesting, easy to use programs which allow them to achieve their learning objectives. Strempl placed little importance on portability, convenience and adaptability.

Portability was not seen as a significant factor because computers are in common use at work, home, and in the community, and this means that students may access them if required. Strempl felt that programs or hardware that were inconvenient to set up or difficult to access were not a significant problem because, once something has been loaded, it was ready to use for as long as it was needed during a session. Indeed, the point was that the positive educational benefits outweigh these difficulties.

Table 4.2: *Teacher ratings of computers on twelve criteria*

Criteria	Rating
Objectives	5
Outcomes	6
Approach	4
Interest level	6
Appropriateness	6
Flexibility	5
Adaptability	3
Learning	6
Familiarity	4
Portability	2
Convenience	2
Ease of use	6

Outcomes and interest

Computers are not used as time fillers at the ALU. Student objectives are matched to expected learning outcomes, whenever a program is used. *Most people want to work on reading or maths or written expression.* For example, if a student wants to improve vocabulary, then a vocabulary program may be selected. It may contain no graphics or speech, but the student will persevere because the outcomes are matched to the student's objectives. In terms of student interest, Strempl felt that software had to be adult oriented. He believes word processing alone is enough to make computers a viable part of the adult literacy program.

Certainly one of the most important outcomes from the teacher's point of view is that through the use of computers, students *can* work independently on individualised programs. This is not seen by Strempl as having a depersonalising effect:

> *We see as much of students as they need, but they can need us less if they've got a computer that has an appropriate program. It's absolutely marvellous when trying to look after 6-10 students all doing individual programs. While we talk at this moment, we've got one student working on a word processor, to write and also to brush up on typing, another working on the Penn State courseware, a non-reader, and he's obviously learning ... Learning does occur.*

Adaptability

Strempl made the point that very few programs have been empirically tested to add support to their stated educational objectives. Perhaps this was one reason why Strempl rated objectives lower than expected. Another reason for this rating is the approach he takes to the use of software. Strempl feels that the teacher can reuse software in a range of ways to suit his purposes.

> *Well expressed objectives are useful, but you can have your own objectives for using it.*

On the question of adaptability, the low rating (3) does *not* suggest that there is no need for teachers to modify programs. It has more to do with development time. If teachers are going to develop their own courseware, with HyperCard for example, then there is a need for a change in the way time is allocated to them. As Strempl explains:

> *We need a lot more lead time or monetary input to get things done. At the moment there's so much teaching to be done; there are so many people in need here. We can't say OK we'll close up for three months while we design one or two pieces of you-beaut computer programs that will help people when we open up again. We need time.*

Appropriateness

Although Strempl agrees that there is some lack of appropriate software, he points out that there are always appropriate programs to be found and increasingly more!

> *We've just bought lots of stacks for HyperCard; Some have limited use and some will have applications but they are coming out at a rate that makes it hard to keep up with what people have produced, let alone saying let's commission something more.*

Strempl believes software does not *have to* reflect current thinking on language and the development of literacy. If it did, that was fine. If it did not, that did not mean an appropriate use could not be found for the software.

> *People today tend to turn their backs on programmed learning, which can be proven to be pretty effective, and say we don't like that, we like teaching this way. The best thing to do is to become knowledgeable about software and use it appropriately. One should also be able to say, well, it's not appropriate at this stage, for this person, for these reasons.*

The IBM *PALS* program (Grimm 1988, Karlstein 1988) was cited by Strempl as an example of what may be an exciting program, but, because of the phonics type approach, may not get the support from the *academics* that it may deserve.

Flexibility and ease of use

The flexibility that a broad range of software and hardware provides is closely linked with its appropriateness. As only part of the overall teaching strategy at the ALU, computer-based technologies allow the teacher to be responsive to students needs. If something is not working for a student, then one should try something else, Strempl suggests:

> *If there is a broad enough range of learning alternatives, something is going to work, if you're responsive to students' needs.*

There are programs at the ALU which are not easy to use; and they are not used. For adult literacy students to be able to work through programs, directions and problems need to be simply and effectively presented. Speech and graphics provide low literate users with the help they need to use programs more independently. Finally, the more expansive, difficult or complex the technology, the simpler the controlling should be.

From the administrator's point of view

Dr Brian Nussey manages the School of General Studies at Gilles Plains TAFE. In this capacity he has been responsible for helping to build the technological support for adult literacy learning at the ALU. Nussey's role has been two-fold: firstly, to validate what teachers want to do and, secondly, to ensure that resources are there for things that are appropriate. He sees the use of computers in adult literacy learning as exceptionally worthwhile. The criteria ratings set out below in **Table 4.3** reflect this very favourable response.

Costs

From the administrator's point of view, costs were considered the least favourable aspect of providing a computer-based literacy program. The costs, however, were not so much in terms of equipment, but rather in terms of time, he stated:

> *In the literature there are a large number of programs. But they only become useful when someone has sat down, played with them and decided how they can really be used in the teaching program. This is very time consuming.*

There are the costs involved in developing staff computer literacy. The effectiveness of any new technology or new approach has to be demonstrated, not just talked about. Nussey believes that a more organised approach is needed to inservicing staff:

> *Up until the beginning of the the current financial year, programs have been essentially staff member driven. An organised way of inservicing is emerging ...*

Table 4.3: *Administrator ratings of computers on seven criteria*

Criteria	Rating
Objectives	6
Outcomes	6
Approach	6
Access	7
Management	5
Service/support	*
Costs	3

* Nussey did not consider Service/Support appropriate with regard to computer software and hence no rating is given.

Objectives

Clearly, objectives come into the costs argument. The administrator's view is that there must be sound educational objectives behind the purchase of any technological equipment. The most important considerations when selecting computer-based technologies, according to Nussey, are defining clearly what you want to do, and *then* deciding what hardware and software your site can afford:

> *The decision is made on: What do you want to use this for? Why is this better than doing it another way? Are there cheaper ways of doing the same thing?*

Nussey believes that computers are a very good way of providing effective learning environments. To implement effective computer use, *his* objectives have been to help staff break through the computer literacy barrier, and begin to explore the possibilities. Therefore there has been a significant buying of computers within the School of General Studies over the last four years. Staff have been able to work and play with computers, and therefore become comfortable using them as tools. This has had real benefits for the ALU in that there is administrative support for innovation and for application of effective programs. This also is very significant when one considers the usual low priority given to funding literacy programs. When asked if he had a battle within TAFE to provide enough funds for the ALU, Nussey replied:

> *Yes. In fact, aside from the people involved, literacy is not seen as a very important program. I find that very difficult to accept because what we're talking about are your basic survival skills. Without basic literacy, you haven't got access to all the other things that go on. So the school at*

> *Gilles Plains has looked at maintaining quite a substantial literacy program, with that philosophy, for that very reason.*

Access and outcomes

Nussey reiterated many of the points raised by Strempl, in terms of computers allowing teachers to provide effective individualised instruction. He emphasised that literacy instruction is not like the normal academic curriculum: what people require to be literate is different for each individual. The computer provides access to learning for a wide range of learners. One of the important outcomes of this is that learners have a better chance of seeing some progress in their learning.

> *We should be providing an environment where, having made the courageous decision to enter a literacy program, adults can actually see some progress. That's not saying you can't do that without computers – you can. But it's easier if you have on your desk a tool that is usable in a very individual way.*

Management

Nussey believes that using computers created a need for more efficient management of resources. For example, a current project involves the development of a catalogue of all the software in the state, relevant to adult literacy learning. Also mentioned was an innovative funding strategy which has direct benefits for poorly funded adult literacy programs. This involved the purchase of a classroom set of computers, across the college. A number of different curriculum areas at Gilles Plains TAFE put in funds towards buying a classroom set of Macintosh computers, which will be jointly shared. The computers were cheaper in bulk and the ALU will not have to outlay enormous funds to enjoy the benefits of using them.

Finally, TAFE has changed the way it approaches staff development: provision for the disadvantaged has been designated as a strategic priority. According to Nussey, this means that staff development dollars will be spent to help people develop skills to cope with provision for the disadvantaged, and part of that has to flow off into the literacy area.

Conclusion

Computers are *part* of a successful learning environment at the ALU at Gilles Plains College. They help provide a diversity of learning experiences based on students' needs. Indeed, what comes across very strongly is that students, teacher, and administrator, all believe significant learning occurs through the effective use of computers. The key word is *effective*. Being effective involves providing appropriate, interesting, easy to use programs. Further, it involves matching the learning task with student objectives. Matching learner and task can often mean that the task is not computer-based at all; there is no compulsion to use the machines.

The comment made by one of the students, "Why change a successful action?", may well be be put conversely: "Why continue with an unsuccessful action?" By choosing learning alternatives, we may be able to create learning environments which are driven by student needs and fuelled by learning successes. There is no suggestion that learning from computers should replace other modes of learning. The suggestion is that computers make it easier for teachers to manage environments where students are working on individualised programs. Computers can allow students who have always had to rely on others for help, to work independently.

The appropriateness of software was addressed in a number of ways. Firstly, it was felt there is an increasingly better range to choose from, and a need to evaluate and catalogue what is appropriate for adult literacy use. Secondly, the point was made about the need for teachers to consider the educational approach of software openly. Software, it was felt, did not necessarily have to reflect current learning theories. It was argued, that it was more important for a teacher to find what worked for an individual student, than to blindly accept that something should work because it fits a current theory.

If computers are to be used effectively, teachers need time to explore the possibilities the materials have to offer. Proposed staff development provisions in TAFE may well help address this issue. The problem is exacerbated by the advent of creative tools such as HyperCard, which, given development time, offer considerable promise for education, and for literacy teaching in particular.

5 CASE STUDY:

Literacy at a Distance with Teleconferencing

Background to case study

Teleconferencing has been used for a number of years in the commercial world to enable businesses to connect more than one person to a call for the purposes of facilitating discussion, particularly when distance has been a problem. It is only more recently that education has begun using teleconferencing as a means of providing learning for students who are disadvantaged by distance, access, or local expertise, to the specific learning they need.

This study focuses on literacy provision for students who do not have access to appropriate learning facilities or expertise in their local community, and for whom learning through teleconferencing has been a viable alternative. This has been done by observing teleconferences, examining available literature on teleconferencing, and discussing with students, teachers and administrators their experiences about teleconferences. Using the framework established in Chapter 2, this study seeks to evaluate teleconferencing when used for adult literacy teaching in isolated communities.

First experience of a teleconference

The room is empty apart from a few chairs, a table *littered* with microphones, and a telephone connected to a teleconference bridge. Excitement builds. The three participants in the teleconference wait expectantly. The telephone rings, the chairperson answers and the first of the groups participating in the teleconference is connected. In quick succession two more groups phone in and are hooked automatically into the teleconference. The chairperson introduces each of the participants and everyone has the opportunity to greet one another. Ground rules are laid to facilitate the smooth running of the teleconference and, without fuss or bother, the teleconference is in full swing.

Each of the participants received an agenda prior to the teleconference and so were aware of the content and procedure for the meeting. Issues were raised and each of the participating groups was asked in turn for comments and suggestions. If groups wanted to clarify, or add a comment, they identified themselves before speaking, so that everyone would know who was speaking. Suggestions could be talked through immediately, as one can do when people are present at a meeting or in a classroom. Questions could be answered as part of the dialogue, and arrangements made without any of the tentativeness that comes when communicating individually or by letter. Having one person to direct the conversation, meant that everyone was encouraged to speak and no-one was overridden or drowned out.

At the end of the hour, everyone responded positively to the teleconferencing medium and comments were made that it had reduced the feelings of isolation, of not being able to participate in decision-making, or in events due to diary clashes.

Teleconferencing and DUCT

Teleconferencing uses telephones to link three or more people in two or more locations. This means that people can speak to more than one person, at more than one location, at the same time. DUCT (Diverse Use of Communications Technology) is one form of teleconferencing. It was developed in South Australia by the Educational Technology Centre of the Education Department. It uses a loud-speaking telephone with multiple microphones. The first component of the system took the form of a terminal plugged into a normal telephone socket and power supply. The terminal provides up to six microphone inputs and an amplification system (see **Figure 5.1**). The DUCT terminal is connected to a loud speaker which is voice-switched and is capable of being heard in a classroom of 30 students (Dunnett 1986: 30).

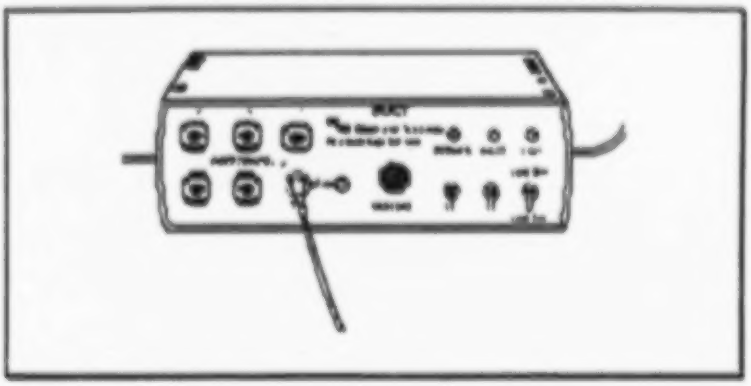


Figure 5.1: *View of the DUCT terminal showing the microphone inputs and amplification output sockets*

The voice activation component of the system means that the noise feedback from the amplification system that would otherwise be set up in a continuous loop is terminated by the voice switch. When groups and individuals are linked together, at up to ten different locations, this type of multiple connection is possible through the use of a Telecom-owned device known as a *conference bridge* and is referred to as a Telecom Operator Assisted Call (Dean and Hosie 1985: 342).

Aborigines use teleconferencing to acquire literacy

Imagine a photograph of a group of students on a desk, a loudspeaker telephone, the worksheets for the day's lesson, a clock to maintain a check on the time, and a teacher (**Figure 5.2**). At the other end of the line, a group of students with their worksheets, and the *eyes* of the group – a person prepared to facilitate answers and to check that students understand what is required of them as the teleconference proceeds (**Figure 5.3**).

The students decided, in consultation with the teacher, what they needed to be learning prior to the lesson. The teacher worked out the lesson, complete with an agenda for the teleconference, and sent it to the students within a couple of days of the last teleconference. In this way students may prepare for a teleconference.

Each student is invited to participate by the teacher, who notes on a log sheet prepared especially for the purpose, who has participated and how often. Sometimes a student may not want to contribute an answer at that point, in which case the *eyes* of the group intercedes, noting the fact verbally for the teacher. Clarification is constantly made by encouraging students to speak more loudly or more slowly, or reiterating what has been said using the more usual form of English. The teacher maintains the direction of the teleconference, asking for suggestions or comments for the next session, and checking that everything on the lesson worksheet for the written assignment is understood before closing the teleconference. The group has been on-line for about an hour.

Figure 5.2: *The teacher's communication system with her students: a telephone, a DUCT terminal and a microphone*

Figure 5.3: *Students using the DUCT for teleconferencing with their teacher in Adelaide*

Students also have facsimile facilities so that work can be exchanged immediately and feedback given if something is not understood. Completed assignments can also be faxed to the teacher for marking and return, to avoid the problem of delays with the mail system, particularly to remote outback communities where mail can take up to two weeks for delivery (Glacken 1988: 2).

How the study was conducted

The case study was conducted initially by examining the literature with regard to teleconferencing. As this was being undertaken, areas where teleconferencing is being used were noted. Examples of teleconferencing were then observed from the teacher's viewpoint. Finally, the evaluation framework from Chapter 2 was used to discuss the usefulness of the technology with one teacher and administrator.

Literature about teleconferencing

Most of the literature surveyed in this section emerged from references made by the people spoken to in the course of the case study. In selecting what to include, we have focused on those aspects of teleconferencing that have been successful, as well as reasons for the success of the medium, particularly as it affected literacy students. Also included, are the problems encountered, the lessons learned, and ensuing developments, especially as these relate to understanding the use of teleconferencing for adult literacy.

The developer of the DUCT terminal warns against the use of conventional methods of delivery for teleconferencing (Dunnett 1986: 32). He sees that such use almost destroys the interactive process upon which the medium depends for success. He uses an analogy that likens the interactive process to the movement of a boat on a pond, with a hinge for a universal joint, as opposed to direct movement. Teleconferencing using conventional methods of delivery is like moving the boat, disconnecting it before the next move is made, and expecting it to be in the same place when the next connection is made. Instead, he suggests, modern media has the potential to engage all our senses, and student-teacher interaction needs to be continuous and interactive.

The work by Lundin and Russell (1984) is valuable for those who wish to improve their teleconferencing skills. However, this review focuses mainly on important principles that need to be taken into consideration when involved in teleconferencing, in order to make the medium an effective and interactive approach to learning. These are detailed in **Panel 5.1** (after Lundin and Russell 1984: 33-36).

The Victorian experience of teleconferencing for adult literacy provision gives two models of use. The first is at Preston College of TAFE where the tutor was linked to individual literacy students in their homes via teleconferencing. The second model is at Yallourn College of TAFE where tutors were trained using teleconferencing and then taught students in a face-to-face situation. This model involved a small group of students based at Yallourn College with microphones and a loud speaker telephone and up to nine *legs* with individuals on conventional hand phones (Waterhouse 1987: 5).

Letter exchanges became an important part of the teaching/learning process at Yallourn College, and were a fundamental element in the programme design. Although teleconferences allowed for group interaction and input to the training process, the individual letters were considered crucial. The letter exchanges allowed the trainer to pick up and respond to individual questions, concerns, and suggestions, as well as stimulating, clarifying and extending the tutors' learning. The letters were also particularly important in terms of modelling or demonstrating the processes being advocated for student-tutor interaction (Waterhouse 1987: 4).

Panel 5.1

The psychology of distance communication

- *Interaction is crucial for successful teleconferencing.* Interaction can be achieved through participation which is fundamental to effective learning and needs to be built into program designs. One of the suggested ways that this can be encouraged is to have structured as well as open interactive periods in the teleconference hookup. Another way is to call upon individuals and/or groups systematically to contribute in some way.
- *A personalised, warm and supportive atmosphere or mood needs to be developed during the teleconference.* It is thought that if the mood of the session is relaxed, friendly and open participation will be more complete, and participants will leave with a greater feeling of satisfaction and goodwill. A fine balance between informality and task-oriented elements need to be achieved.
- *Presenters should use sound educational techniques.* To ensure that effective communication takes place, traditional and creative educational techniques should be incorporated into teleconferencing. A variety of methods can be used to facilitate this.
- *Two-way feedback is necessary to ensure that communication has occurred and to assist programme organisers to improve future sessions.* A number of ways are given where feedback can be encouraged in a positive fashion.

Lundin and Russell (1984: 33-36)

In evaluating the success of teleconferencing for literacy in the Victorian projects, Jones (1987) attributed the success of programmes using teleconferencing to the elements which are shown in **Panel 5.2.** The views here by Jones reflect the success of other teleconferencing programmes and justify the comments made by Lundin and Russell on how to hold effective teleconferences.

Glacken (1988: 1) explains the use of the term *teletutorial* as a specific type of teleconferencing conducted by the TAFE School of Aboriginal Education in South Australia. The term describes a group of students in a country or isolated situation coming together in a classroom for a weekly *hook up* with their lecturer who is located elsewhere, for study.

Some of the benefits of teleconferencing are seen by Glacken as being an opportunity for students to study close to home and to provide tuition in subjects not otherwise available in country areas, because of a lack of skilled teachers or resources, or to supplement existing courses. Teleconferencing is also able to give students both support and immediate feedback, from teachers and other students. It gives students the opportunity to discuss their ideas and to voice their opinions in a familiar, and non-threatening environment. Glacken emphasises the fact that teleconferencing is a highly intensive form of teaching/learning and requires a very structured approach to make the most use of the time spent *on line.*

After an initial trial of teleconferencing with Aboriginal students, Kirk (1986) in his review of the use of the medium thought that it helped to reduce feelings of shame and shyness that eye-contact can cause. The maintenance of anonymity and confidentiality can be very important, especially for adult literacy students who have sought to hide their lack of literacy, perhaps for many years. The method of communication used in teleconferencing means that the need to verbalise all responses results in better use of speech, and enhanced listening skills. This has been particularly valuable for Aborigines such as police aides and Aboriginal health workers who needed to improve their oral literacy. Kirk states that teleconferencing has been very successful in achieving such objectives. Teleconferencing also encourages greater assertiveness among participants, as the voice switching mechanism can only be activated by speaking firmly. Questioning techniques, too, were found to improve through the use of teleconferencing, as learners found that they have only voice communication to rely upon to aid their learning.

Panel 5.2

Successful elements of a teleconference

- Motivation on the part of the student. Each student was interviewed before the commencement of the program to help them have a clear understanding of the procedures and their responsibilities and to give them the option of participation.
- Support from a volunteer tutor apart from the teleconference time.
- The educational resources/materials used were student-centred or theme-based which meant that the student interest and response rate was accordingly high.
- Evaluation of each session took place by asking each student questions about the session, keeping a chart on the participation of each student, and making notes of the students' comments and literacy needs.
- The teleconference group tutors offered support and encouragement outside of the teleconference by using two or more of the following: face-to-face meetings during the programme, weekly newsletter, personal letters and personal phone calls.

Jones (1988: 32-33)

However, not everything about teleconferencing is successful, if certain procedures are not kept in mind. Dean and Hosie (1985) present some of the barriers to teleconferencing that can occur, such as the lack of non-verbal cues present in face to face meetings. Another difficulty can occur when participants use short acknowledging gestures such as *uh-hu* or *yeah* which are characteristic of normal speech. However, when removed from the normal accompanying visual cues, such as a nod of the head, they can be mistakenly interpreted by the principal speaker to indicate disinterest. They can also trip the automatic voice switch on a loudspeaker phone, causing the principal speaker's next words to be *clipped*, which can then lead to frustration with the medium. These constraints, it is suggested, lead to a modification of conversation style. Speakers use longer sentences, followed by pauses, which act as cues for feedback from other speakers. This can result in a more formal and structured communication style. It also places greater responsibility on the chairperson to ensure that all the participants are at ease and have the opportunity to contribute (Dean and Hosie 1985: 343).

In concluding their article, Dean and Hosie (1985: 343) state the greatest asset of teleconferencing is its interactive abilities; it works best, they say, when interaction by participation is encouraged. Strategies to maximize interaction need to be developed and included as an integral part of any teleconference. They suggest that both structured and free interactive periods should be incorporated, to encourage both group and individual participation. A personalized atmosphere, in which individual contributions are welcomed, will result in more effective interaction.

A cautionary note is, however, in order for technologically-based interaction should not be seen as a substitute for face-to-face communication (Dean and Hosie 1985: 343). Audio communication is not *total communication*. It is less satisfactory than face-to-face interaction for tasks requiring negotiation. These authors suggest that teleconferencing should be used in conjunction with face-to-face contact.

Various projects have found that to ensure complete student concentration certain criteria should apply. As many distractions as possible need to be removed from the learning environment to have acoustic conditions at an optimal level. The design of print material to support the learning environment is also a key factor in the response of the student to the learning medium. It is considered important to establish a personal rapport with students in order that each lesson be a success. Questions need to be directed at individuals, rather than the class generally, and sufficient time allowed for a reply (Dean and Hosie 1985: 343).

Another instance of dissatisfaction with the DUCT system has led to a development that is better suited to local conditions. Anderson (1986) has been involved in using DUCT equipment in the Northern Territory and reports that the success of the southern states has not been replicated. Voice-switching, which is an inherent part of the DUCT system, does not perform well when the communication conditions are not of a high quality. Anderson makes an analogy of voice-switching to cars crossing a one-lane bridge. Conversation can only take place in one direction at a time. When one person finishes speaking and the other starts, the equipment detects the second voice and switches the second machine to *speak*, and the first to *listen*. It changes back again when the first speaker responds again. The electronic switch alternates as the speakers alternate. They cannot normally speak simultaneously, and they cannot hear the other party while speaking themselves (Anderson 1986: 124).

However, with telephone line noise that is not continuous or uniform, the DUCT equipment does not respond well. In order to overcome these problems, the Northern Territory Educational Technology Unit has developed a *Classphone* which does not use voice-switching. The teacher can hear the students all the time, and the students can hear the teacher all the time, despite any interference that may come down the line.

Apparently, the human ear is able to be much more selective than an electronic switch, and can distinguish speech and other sounds against a reasonably high level of background noise. The lack of voice-switching would normally set up the acoustic feedback *squealing* through the loudspeaker system from the microphone. However, by using headphones this problem is overcome. To avoid restricting the movements of the students by the length of the headphone cables, cordless headphones have been introduced. It appears that this solves the problem of extraneous noise deactivating the voice switch successfully (Anderson 1986: 125-6).

The hardware

The hardware includes the following components: DUCT terminal, telephone, microphone and loudspeaker (**Figure 5.4**). The costs of teleconferencing, according to the School of Aboriginal Education at the Adelaide College of TAFE, include the capital cost of the DUCT terminal and six microphones, which is approximately $1,300 for each site. On-going costs include the cost of the STD call or local call, and the time of a lecturer in preparing for the teleconference, and marking assignments. A facsimile unit at a cost of $2,200 is also a capital cost that needs to be considered.

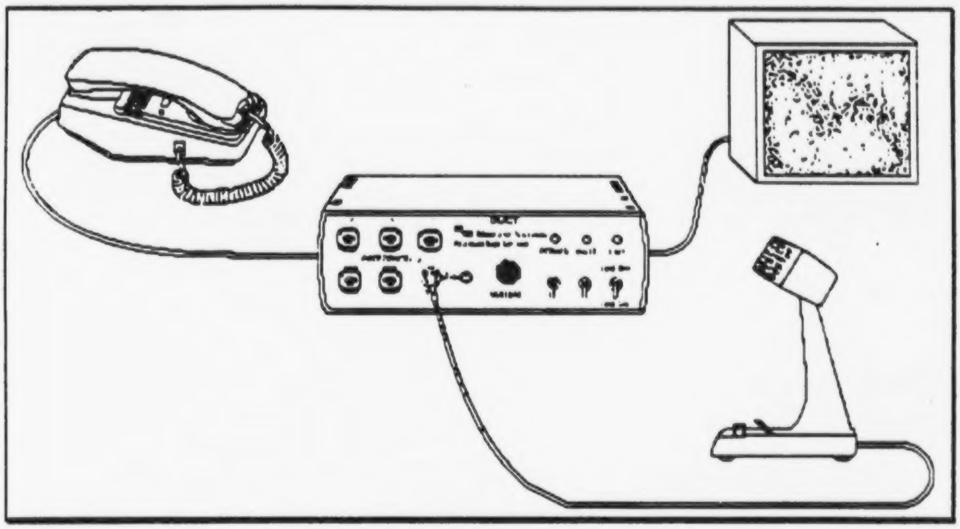


Figure 5.4: *The equipment incorporated into the DUCT system: DUCT terminal, telephone, microphone and loudspeaker*

From the teacher's perspective

A teacher involved in providing literacy to Aboriginal students in remote Aboriginal communities using DUCT teleconferencing and facsimile facilities was interviewed. As she had been involved in teleconferencing from its inception in South Australia, many of the questions asked of the administrator could also be asked of her due to her wide experience. She is working in the field of distance education for Aborigines and consequently her comments apply to that particular situation. The ratings given to each of the criteria are set out in **Table 5.1.** Each of the criteria received ratings of between 5 and 7 showing the satisfaction this teacher has in using the teleconferencing medium. Ease of use was rated lowest with 5, perhaps indicating that the medium has the potential for improvement in this area.

Objectives and outcomes

The teacher commented that the educational objectives are clearly stated because they are discussed with the students before they begin learning through the teleconferencing medium. It was considered that students would improve their oral communication skills by taking part in the teleconferences. Objectives were rated as important (Rating 7).

The outcomes in using the technology were rated as highly satisfactory (Rating 7). Documented evidence from teachers and student course evaluations were cited as instances that the technology has been satisfactory. The technology has been deployed with a lecturer with expertise located at one site and students at a second site, thus providing educational opportunities that would not otherwise be available. The teacher hopes that the technology will afford maximum interaction and student participation, so that effective learning will be facilitated. It was felt that the only other means where learning would be more effective would be where the expertise was available on site. The teacher commented that other existing tools and equipment could not produce similar outcomes.

Table 5.1: *Ratings on twelve criteria from the perspective of a teacher*

Criteria	Rating
Objectives	7
Outcomes	7
Approach	6
Interest	7
Appropriateness	7
Flexibility	7
Adaptability	6
Learning	7
Familiarity	7
Portability	6
Convenience	6
Ease of use	5

Approach and interest

Approach was rated highly (Rating 6) because it reflects the educational thinking on language and learning of the teacher questioned. She thought that the approach provided a safe, secure environment for students wherein they could learn effectively. It also encouraged students to be autonomous in their learning. Students were able to *own* the programme through the technology. She thought, however, that the approach underlying the technology may not be acceptable to all teachers.

The teacher commented that students who are not normally constrained by time always arrive promptly in order to begin the teleconference session and, if a session is missed, students usually make up the lost work and do assignments regularly. Interest in using the technology was rated highly (Rating 7).

Appropriateness

The teacher thought that support materials were developed as the teachers became more knowledgeable about the medium. As the programme is a needs-based one, it is appropriate that the materials be developed in response to the needs of the learners. It is thought that the technology gives students choices in how they learn, especially in whether they respond to a question or not. The technology is seen as the teaching environment, but is sufficiently flexible in that it is also a tool to facilitate student learning. The technology combines effectively with previous methods such as the use of print-based materials, and is especially effective when teleconferencing is used in conjunction with preliminary classwork. The teacher considered that the use of teleconferencing was most appropriate at this time for students. Without it, they would have little opportunity for learning. The use of DUCT means that the students are able to achieve their learning objectives.

Flexibility and adaptability

Teleconferencing can easily be incorporated into the classroom situation. The technology is able to be adapted for use with different levels of students simply by using a different teaching methodology with the student. The nature of the technology means that it is best used with a group of students rather than on a one-to-one basis. The technology does have a wider use than originally intended, in that it can be used to deliver learning for a wide range of students and in a wide variety of topics. DUCT can also be used with facsimile facilities to extend its flexibility. It can be extended also by incorporating the use of computers linked by modem, which potentially opens new vistas in the realm of distance education. The approach was considered flexible enough to allow adaptation according to the needs of the students, and consequently received a rating of 7.

In response to the question whether the technology can be used without modification, the teacher generally agreed but reported that radio interference was sometimes a problem. She did not think that the equipment or the materials needed adaptation when used by students. The educational content of the learning materials can be designed and adapted by teachers as student needs are discovered. The technology is not adaptable to different student needs but the materials and the methodology can be changed as the students needs are considered. Adaptability was rated 6.

Learning

The teacher interviewed thought that students were able to interact with the material. to learn at their own pace, and to learn at a time convenient to them, but she added that it did not necessarily allow students to learn in a style that suits them. The technology, she thought, could also allow passive learning, simply by the fact that students need not respond if it was inappropriate for them to do so.

Familiarity

Teachers need to be familiar with the technology in order for it to be an effective medium of use. The teacher said that when she began working with teletutorials she was not sufficiently prepared. However, she feels that she has learned by trial and error, whereas teachers coming into the field now are given inservice preparation before they begin using the medium to teach. Most of the problems she faced involved using appropriate teaching methodologies and not knowing how to deal with technical hitches as they arose. Students do not need to be too familiar with technical aspects in order to take part in a teleconference. However, as students became more familiar with the medium, they could use it more effectively to assist them in meeting their learning objectives. Familiarity was rated 7.

Portability and convenience

The main constraint in using the technology is the need for a telephone connection in both places, hence a rating of 6. The teacher interviewed thought that the other equipment could readily be transported according to the situation in which it was needed. The technology is such that it can be easily used by students at home if necessary. An ordinary telephone can be hooked into a teleconference through the use of a teleconference bridge. DUCT does not require a skilled technician, but can be easily set up by staff or students, although in the initial stages of becoming familiar with the technology, it is comforting to know that someone can be called upon if something does go wrong. Directions can easily be given by phone from the teacher to students. so many problems can be resolved simply by talking through the set-up procedure.

Students do not find it time consuming to access the technology, and quite often have to set the equipment up themselves. They can study either in their own home or close to their home, which means they generally find studying via teleconference quite convenient. Convenience was rated 6.

Ease of use

Teleconferencing can sometimes leave both teachers and students feeling frustrated, particularly for those students living in remote areas when radio interference causes a problem for the telephone connection. Another problem was that often teachers are not given adequate preservice training in the use of the equipment but are often assumed to be able to work it out as they go along. This factor served to lower the rating for ease of use (Rating 5). However, if preservice training is provided, it does not take long for teachers to master the technology. The teacher thought that it was possible for the technology to be effectively used without having a complete mastery of it, but she felt that this was not appropriate use of teaching resources or time in the long-term. She added that it was not necessary for teachers to refer to documentation constantly to use the equipment.

Obviously, the particular teacher interviewed was quite happy about using teleconferencing as a delivery mode for literacy teaching with Aboriginal students. Some of the comments made are situation specific, but others are relevant to adult literacy across many situations. With the proviso that the comments expressed here are essentially the view of one person, teleconferencing rates well as a mode of delivery of literacy for adults.

From the administrator's perspective

In questioning an administrator about the criteria, it must be kept in mind that the person interviewed was working both in an administrative capacity and also teaching. Therefore some of the comments may well be slanted toward the teaching situation. The administrator ratings appear in **Table 5.2.**

Table 5.2: *Ratings on seven criteria from the perspective of an administrator*

Criteria	Rating
Objectives	7
Outcomes	7
Approach	7
Access	7
Management	7
Service/Support	4
Costs	6

Objectives and outcomes

The administrator stated that there are clear educational objectives: the technology is the medium of teaching and, therefore, the curriculum of the subject is the educational objective to be achieved. The objective of using the technology is to facilitate the attainment of the educational objective of the subject being studied. The objectives are important for both students and teachers. Hence, the rating of 7.

Outcomes were rated as very satisfactory (Rating 7), the administrator stating that the equipment is the best available for the particular teaching situation. There is evidence that the technology is educationally effective in that more than 80 per cent of students complete the course of study among those students who use teleconferencing in the School of Aboriginal Education at the Adelaide College of TAFE. It has also been documented that students who miss a class usually make up the missed work and generally do all the assignments (Glacken 1988: 4).

Approach

Teleconferencing offers new approaches in learning for students who would otherwise be denied the opportunity. The technology enables students to participate in communication and interaction that other technology is not able to replicate with the same success. The teachers involved in using DUCT as their medium of teaching are generally supportive of the technology. However, some teachers have found that it does not fit with their teaching style and have moved away from using it. The administrator felt that it is not a medium that can be used comfortably by everyone. Nevertheless, it still received a rating of 7.

Access and management

Access also received a high rating of 7. The administrator commented that the technology would be useful for a wide range of students. Teleconferencing is best used with small groups of students, although it can be used with individuals too. The technology does have the potential to be used by many students, although not really at the same time. The only possibility of precluding students from using the technology, it was stated, was lack of funds to run courses. The administrator thought that cultural reasons did not exclude students from using the technology and cited the instance of Aboriginal students who felt more comfortable using teleconferencing because they did not need to meet the eye of the teacher. In answer to the question whether or not special assistance was necessary in order for all students to use the technology, the administrator stated that DUCT units were available in all TAFE facilities and most Education Department facilities in South Australia, and so access was not a problem.

It was thought that the equipment could easily and quickly be set up by students. Closing down the equipment was as easy as hanging up on the telephone. Management therefore, received a rating of 7. The services of a technician are not required in the day-to-day use of the equipment, except for servicing and maintenance, and one person is able to operate the teleconference bridge and facsimile machine and conduct the learning session without the assistance of other personnel. The equipment is best utilised when a number of people are using it rather than individually.

Service and support

Service and support did not rate well in the opinion of the administrator, only receiving a rating of 4. The on-going support and servicing of the equipment was not considered good and a backup unit is needed to cover situations of break-down as the servicing can take quite some time. There have not been any informed or specialist advisory staff to assist with difficulties as they arise, but rather teachers have been left to cope as best they can. Modifications of the product should not make current models obsolete. As to the question of updated versions being readily available, the response was *Who knows?* It was thought that costs would be a consideration.

Costs

The costs for teleconferencing are primarily capital with a DUCT unit costing about $1,300. There are additional costs in providing adequate and compatible hardware such as a facsimile machine which costs about $2,200. Any learning materials which are used with the technology have to be developed by the teacher. The only personnel costs involved in using the technology is the lecturer's time. In answering the question about the cost of training, the administrator commented that there should have been training costs but that generally this has not occurred. There are on-going costs for servicing, materials development, production and delivery of the technology; but there would also be costs in the absence of the equipment if staff were located in remote locations servicing only a few students. Costs was given a rating of 6.

The administrator's comments clearly show a high degree of satisfaction with DUCT as a mode of delivery of literacy for adults. Again, it must be kept in mind that the comments reflect the views of just one administrator. Therefore the comments in this section need to be considered in conjunction with the review of other programs in the literature survey section.

From the perspective of students

Time and resources did not permit us to find out what students thought of teleconferencing directly. However, written student evaluations provide some indication of how students view the use of teleconferencing as a medium for such learning objectives as basic functional literacy, literacy to keep up with a rapidly changing technological society, and to improve job skills. **Panel 5.3** shows a representative sample of student responses, selected from the bi-yearly publication of the School of Aboriginal Education (1988).

Some student comments from a teleconferencing distance literacy course held at Box Hill in Victoria show that the needs of the students were on the whole being met (McLaine 1988). These students reported that:

- the group helped other people who were having trouble;
- everything was friendly and everyone was in the same boat;
- they learned to talk up if they wanted to say something and they learned to listen;
- they found it comfortable in a small group;
- they found it difficult to listen and concentrate; and
- they felt that using teleconferencing helped teach listening and conversation skills.

Other comments from The School of Aboriginal Education in Adelaide show that students are aware that learning is appropriate for them, with many comments about how easy it is to learn with teleconferencing. Other views reflect student interest level. This is very high, shown also in the good attendance rate and excellent response to the assignment work. Comments such as the following are indicative of Aboriginal students' response to the teleconferencing medium:

- Easier to learn.
- A range of subjects can be studied or requested.
- Teletutorial classes are interesting.

- Everyone helps each other and we enjoy one another's company. When I first started Teletutorials, I felt a bit shy and frightened to speak too loud but now I am much more relaxed and at ease (Glacken 1988: 3).

Panel 5.3

Student responses to teleconferencing

Aims for this year:
  Tell the time
  Learn more words
  Use a calculator
Aims for the future:
  Move from Port Victoria
  Live where its greener
  Build our own mud brick home.

Marie

I'm going to TAFE to improve my English and studies: to improve my skills a bit more. This will help me if I ever try to apply for a job. Also to keep up with today's world with all the metrics and computers, so I will be able to help my children with their schooling problems.

Soraya

My name is Darryl. I come from Coffs Harbour, I lived in Coffs Harbour for about five years. Then we moved to Kempsey then I left at the age of about nineteen. I first got my job in a sawmill in Coffs Harbour I stayed on the job for four years then I moved to Sydney. Then I moved to Mildura to do some grape picking for two years. Then I heard about the Wiimpatja Norta Worta Kuli program the program has been designed to help Koories who want to improve their education or work skills. It will also help those who just want something to do. Wiimpatja is giving you more skills. This year you can improve your educational skills even those who have difficulty reading and spelling and then they can go to RTL program at TAFE. Then this will lead on to VCE courses and you can improve your job application skills by practising interview techniques. The Wiimpatja program will help you in deciding which career you are best suited for, and it is for those who are not sure what to do, but are tired of doing nothing. The Wiimpatja program will help you to decide what direction you wish to go, also the program teaches you Aboriginal Studies, English, Mathematics and Computer Studies and also the Wiimpatja Norta Norta Kuli program is for unemployed koories. The age is about sixteen years to older age people and the Wiimpatja program goes for eighteen weeks then if you wish to continue the program you can enrol in the second eighteen weeks. The reason I joined the program is to get more education like mathematics and Aboriginal Studies.

Darryl
School of Aboriginal Education (1988)

The expectations of the students can be quite diverse and varied as these comments from students show.

It seems that these students, at least, are favourably disposed towards teleconferencing. They have found that it meets their expectations and their objectives for learning. They have enjoyed the learning experience and have been successful. These comments could be strongly persuasive as to whether teleconferencing is used in an adult literacy program, insofar as the needs of the students are of paramount importance in ensuring success for the learner.

Enhancing the technology

The teleconferencing medium continues to be developed with the addition of computing facilities to the DUCT teleconference and facsimile transceiver. One such enhancement (see **Panel 5.4**) involves Macintosh computers connected by modem using *Intermac* software.

Panel 5.4

Mac-Fax-DUCT

Requirements: 1 Mac Plus] a Mac SE with hard disk could
1 External Hard disk 20Mb] be used instead
1 Modem
1 DUCT system
1 Facsimile machine

The modems need to be identical in order to overcome problems of *talking to one another*. Baud rates also need to be identical.

Currently, the system uses *Intermac* software to communicate between the Macs, which needs a hard disk to run. The system, termed *Mac-Fax-DUCT*, can only operate between two points, though it is hoped *Intermac* will soon be developed to be able to multi-point between several locations.

Present users of Mac-Fax-DUCT prepare the lesson before hand on a floppy disk and send it to recipients of the lesson, rather than downloading the information, as it is found this takes an excessive amount of time which can be avoided by using floppy disks. This could be a problem though in situations where the system is being used in remote areas and postal access is slow.

Superpaint and *MacWrite* are two programs currently used in Victoria with this system. On-screen writing using pen or mouse has not been found effective as it highlights the inaccuracies in people's handwriting, and creates a further barrier in the learning process. If handwriting is the simplest way of conveying a message, then Fax machines can do it far better than computers.

The DUCT system allows immediate response and feedback to take place as the learning occurs.

Further information regarding this system can be obtained from the Victorian TAFE Off-Campus Network located at 143 Franklin St Melbourne.

Teleconferencing has always used an *Audio Link* through the use of the DUCT and a conference bridge. More recently, a *Document Link* was established through the use of a facsimile transceiver. This is able to transmit typed and handwritten text and also graphs and charts. Now a *Visual Link* is being trialled in both Victoria and South Australia. In Victoria it is known as *Telematics*, while in South Australia it is being called *MacLink* or *Intermac*. The *Visual Link* consists of a Macintosh with a keyboard, mouse, modem and and optional graphics tablet. A video prepared prior to the class can also be part of the *Visual Link*. This does not mean that print media disappears, but rather Intermac is used to support printed materials.

Presently, Intermac is not available commercially as it is still being tested. It is operated as a desk accessory, and it is important that identical systems are used to operate the computers being linked, otherwise the link will consistently *crash*. South Australia uses Electronic Mail to send the lesson via NEXUS, the Education Department's Bulletin Board. In using a modem transfer, it is important that the document with all its formats and graphics is sent to an identical computer in order for it to be received identically. Netcom modems are used with the baud rate set at 2400. However, ultimately, it would be best if the modems were voice/data modems to overcome the problem of needing two telephone lines to conduct the class.

Certain protocols need to be observed in order for learning to be effective. After opening Intermac, whoever moves the mouse first has control. If the mouse is moved too quickly, synchronisation is lost, and so the keyboard is used as much as possible. It is, however, a simple matter to re-establish synchronisation. Initially, it appears that using the *Visual Link* makes the learning very teacher-directed. However, in the tests conducted so far, once the protocols have been established, there is more freedom for the learning to become student -directed.

Macintosh computers were chosen because they were easy to use, there was a similarity between programs, and this computer has the capacity for graphics. At present, the major drawback with the system is the inability to multi-point, or work simultaneously with more than one connection. This is being addressed and it is hoped that multi-pointing will be able to take place before the end of 1990.

Conclusion

Using the evaluation criteria from Chapter 2, it appears that the overall response to teleconferencing is a very positive one. As all criteria are rated quite favourably, it seems that this technology has great potential as a powerful medium for literacy learning, particularly for increasing confidence and self-esteem in oral communication skills. This is supported by the success of the School of Aboriginal Education programs currently using the technology, as well as by evidence from other reviews of teleconferencing.

Teachers who use teleconferencing find that once they become familiar with the environment, they enjoy it, especially if the principles noted earlier in this chapter are adhered to. They are able to assist students to meet learning objectives, students who would otherwise not be able to participate in learning, because of distance, access, or opportunity. Teachers can meet new challenges in using appropriate methodologies for students by teleconferencing, to hone their skills of presentation, and to improve their own communication skills helping them to be more effective in their teaching.

Administrators, too, rate teleconferencing favourably. It has been demonstrated to be cost effective, especially for small groups of students in remote locations for whom the cost of an on-site teacher is considered uneconomic. The fact that telephones are a common feature of nearly every part of our society and are readily accessible to most is an advantage in considering the use of for adult literacy. The technology can be easily managed and learning delivered has been shown to be effective.

Student response was also positive, both by Aboriginal students and by literacy students from native English speaking backgrounds. Teleconferencing provides an environment where the student is in control, can maintain anonymity if it is required, and can overcome the boundaries of cultural differences as has happened with Aboriginal students. Students enjoy the learning experience and are happy with what they are learning. In the final analysis, these seem to be the most important criteria when working with adult learners.

In looking to the future, it seems that the medium can be extended with new developments in other areas of technology. It will be interesting to witness the developments that occur with the computer complementing the teleconferencing medium, or better still, to be at the forefront of these advances, and to be involved in discovering new ways of helping adult students become literate, by using appropriate technologies to make learning interactive.

6 CASE STUDY:

Using Narrowcast Television to Target Remote Aboriginal Communities

Background to case study

We take for granted television within our homes. We do not often stop to consider the technology that brings the *world into our living room*. Nor do we any longer think of the telephone as an amazing piece of technology. We would probably assume that linking the two would be a relatively mundane affair. However, the project trial now completed at the Adelaide College of TAFE has used these two everyday items of technology in an exciting and innovative venture.

In conjunction with Imparja, the Aboriginal television station operated by CAAMA (Central Australian Aboriginal Media Association), Adelaide College has run a series of ten programs using interactive television.

This study focuses on literacy provision to Aboriginal students in remote communities. As far as interactive television is concerned, literacy was examined from the broad perspective of learning the cultural mores of the society. For a long time television has been viewed for its entertainment value. Yet a high proportion of our current affairs and political information is presented on television. It is important that one can view this information with some critical analysis.

The use of television for educational purposes has had mixed responses over the years, so it was with this in mind that the project trial using interactive television for remote Aboriginal communities was undertaken. The study used observation of two of the televised programs as its basis; literature from the experiences of Canada and the United States of America was examined; discussions were held with the project manager and presenter of the program using the evaluation criteria developed in Chapter 2; and written student feedback was also examined.

Observation of an interactive television program

At 8.45 am on a Tuesday morning, for ten weeks, the team from the Centre for Applied Learning Systems at Adelaide College went into action. A telephone call was made to the four Aboriginal communities involved in the project: Indulkana, Amata, Oodnadatta, and Coober Pedy. Once contact was established through the use of DUCT (Diverse Use of Communications Technology – see Chapter 5), the communities could chat to one another, and to the panel in Adelaide, which was in the final stages of preparation before going to air. The Studio at Adelaide College was the centre of production for nine of the ten programs, with the final program televised from a classroom. On each of the numerous television screens in the production studio, a colour band was seen with the logo *Standby for TAFE Interactive Narrowcast*. To check that the satellite hookup was working, each of the communities was asked to report what they could see on their television screens.

At precisely 9.20 a.m., the program went to air. Lorraine Glacken, the presenter for the program, welcomed all the communities to the program and introduced the members of the panel for the program. Panel members were often Aboriginal people. Communities had the opportunity to greet the panel members. The topic for the program was introduced, and usually a short video sequence was shown, although drama and role-plays were used as well. One of the panel members would make a comment following the video, and then the communities were asked for questions. Other video sequences were shown to continue the learning process, as the questions were answered. About halfway through the program, a short video clip of Aborigines playing rock music or singing and dancing was shown to give variety to the program, or to break segments of the topic.

At 10.20 a.m., the satellite transmission concluded, but the audio-teleconferencing continued as the communities asked questions of the panel, or of one of the other communities. This often lasted for about 15 minutes after the program went off air.

What is narrowcast television?

Imparja Television, controlled by the Central Australian Aboriginal Media Association (CAAMA), operates a Remote Communities Television Station for northern South Australia, western New South Wales and the Northern Territory. Under the terms of the licencing of Imparja, it is a requirement that educational material be broadcast. The licence states that "educational programs consistent with established curricula to meet the specific educational needs and interests of the population shall be provided" (Kenworthy 1989: 6). It was with this in mind that the Adelaide College of TAFE became involved in the interactive television project through Imparja.

Schick (1989a: 4) explains that the specific transmission process of *B-Mac* encoding via Aussat means that television programmes can only be transmitted to particular sites participating in the project. B-Mac encoding is a television signal sent to receivers in the Aboriginal communities by satellite. The receivers decode the signal and display it on a conventional television set. The B-Mac system allows selective transmission whereby coding signals are sent with the transmission that allows individual receivers to be *enabled* or *disabled*. This whole process is known as *narrowcasting*, as distinct from *broadcasting*. Schick also notes that the television transmitting authority, Imparja, is compulsorily notified of all the serial numbers of receivers sold within their operating *footprint* (the geographical area to which they are allowed to transmit). A serial number is encoded into each receiver when it is manufactured which makes it respond to the coded signal that accompanies the *B-Mac* transmission.

The licence requirement of the trial was that the programs could not be broadcast into homes. Consequently, Imparja ascertained which receivers were participating in the project and transmitted the program to those receiving dishes which were installed at the designated TAFE facilities in each community (see **Figure 6.1**). On each Tuesday morning of the series, people from each of the communities would gather together, to watch the program. Between 6 and 60 people were recorded as present viewing the narrowcast for the different programs. All other receivers were disabled for the time of the interactive narrowcast in order to maintain confidentiality of the teleconferencing and support the classroom nature of the program. Other receivers were notified by a teletext message of what was happening and when normal transmission would resume.

How the study was conducted

The case study was conducted by initially observing two of the interactive television programs produced by the Adelaide College of TAFE and televised live. Following this, the project manager and the presenter of the programs were interviewed using as a basis for discussion the evaluation criteria prepared by the research team to assess the usefulness of technology for adult literacy programs. A written student evaluation was examined to see what response students made to this new form of learning. The literature was surveyed for other instances of the use of narrowcast television and interactive television both in Australia and overseas.

Figure 6.1: *Aboriginal elders inspecting the satellite receiving dish installed at the TAFE facilities at Amata*

Narrowcast and interactive television literature survey

The literature surveyed, which was largely descriptive in nature, is not exhaustive and is somewhat selective in that it examines what pertains specifically to interactive television or narrowcasting. Kenworthy's 1989 report is particularly useful in that it examines educational broadcast television from a more theoretical stance and concludes with a balanced perspective on the use of television as an educational medium, including reviews of the situation in the United States and Canada. The survey does not get involved in the debate on the psychology of television and its relevance to education.

In Kenworthy's report to the National Heads of External Studies on Educational Television, he states that it is technically possible for *narrowcasting* of satellite television programs to specific locations to be seen by a selective audience (Kenworthy 1989: 4). It is selective because the viewer needs a decoder to receive the signal. He suggests that these programs would not be subject to the same controls as those received by the general community. Therefore, low cost programs could be transmitted without restrictions on technical standards being an inhibiting factor. However, in view of the comments made by Whiting (see **Panel 6.1**) about production standards, Kenworthy's statement may be somewhat optimistic.

There have been other occasions when narrowcast television has been used in Australia. Kenworthy cites two cases. In 1987 TAFE (NSW) conducted hospitality training using the Sky Channel receiving stations located in registered clubs. In Queensland, TSN11 was *narrowcasting* approximately 30 hours each week of interactive programs for professional groups, education, industry and commerce.

As part of the literature search, we received a progress report from Mitchell (1989) stating that during 1990 the South Australian Department of Employment and Technical and Further Education intends to trial the digital transmission of live, two-way interactive television between Adelaide College of TAFE and the two campuses of the Light College of TAFE at Clare and in the Barossa Valley. Thus the trial of the Interactive Television Project is being extended into new areas.

The University of Maryland experience is that if interactive video instruction is to be successful, training programs for both staff and students need to be made available (Kromholz and Johnstone 1988). The University uses studio-classrooms which can seat 50 on-campus students, and are designed to look as much like a traditional classroom as possible. Video cameras, microphones, video monitors and loudspeakers unobtrusively project questions from off-campus students. The off-campus students view the classes on monitors at their workplace, with a modified telephone which links them directly to the classroom, enabling them to interact with the teacher and the on-campus students.

Comments from teachers and students indicated increased anxiety and a sense of being disconnected from the learning process, and of being uncomfortable using the telephone talkback system to ask questions during the class. To overcome these problems, a videotape was produced for the staff using humour to help them learn how to use the interactive television medium effectively. The same was also done for students. Preliminary results, according to Kromholz and Johnstone (1988: 16), suggest that the training program has been successful.

The experience at Ohio State University (OSU) is that as the number of home satellite dishes continues to increase, particularly in rural areas, so the use of satellite television for sending required information to large numbers of people also increases. According to Whiting (1988: 19) "if you can't teach live on site, being there live and in color by satellite may be the next best choice". Classroom studios are the basis of the system, as they are in Maryland. At OSU they found that one person can operate the studio from the control room during classroom use, but that a team of ten to twelve people is required to do a live broadcast satellite videoconference. Perhaps the most interesting aspect of Whiting's article is the documentation of the lessons learned from using satellite television (1988: 21-22). As they are pertinent to this case study, the most relevant lessons are reproduced in Panel 6.1.

North Island College, located off the western coast of Canada, has also been involved in developing an open learning concept which emphasises instructional technology to suit the specific needs of the students. Technology such as television instruction through the *Knowledge Network* via satellite or cable television mean that isolated students can still have access to learning. The *Knowledge Network* broadcasts a wide variety of programs. Some carry university credit, or are for people wishing to upgrade their qualifications, while others are for children, or to support classroom learning.

The Network uses the Anik C Satellite – North Island College has been using this medium continuously since its inception in 1980. All the North Island College courses are live, studio-based and low cost productions but they are "little more than *talking head* plus interview situations" (Kenworthy 1988: 7). However, they also use a two-way interactive audio link which allows viewers to phone in with questions that go live to air. As Kenworthy subsequently remarks:

> Broadcasting (or narrowcasting) is simply a delivery system and is only one of the components that come together to provide a successful learning experience for the student (Kenworthy 1989: 10).

Kenworthy's experience at North Island College clearly influenced the Interactive Television Project trial at the Adelaide College of TAFE.

Panel 6.1

Lessons learned by Ohio State University

- Getting into the television business is expensive.
- A high quality video product must be produced. Viewers know the difference between good and bad video production simply because they have seen so much on television. Production at the level of home video is not sufficient. It brings boredom and loss of credibility.
- More than *talking heads*, the program must contain a mix of colorful, concise, easily understood graphics – from titles to charts and graphs. It also helps to insert pre-produced segments (such as personal interviews or testimonials) to add variety of both audio and video material and to maintain an interesting pace for the program. This applies to both live programs and pretaped shows.
- Some topics just don't work on television. Remember that television is a visual medium: it likes action. It is best when the subject can be demonstrated.
- For a live satellite videoconference, a minimum planning span of two to six months is needed. More than two months is required if considerable preproduced material is needed for the program.
- Faculty involved with television greatly improve their teaching (or presentational) skills. Television forces them to mold their often wordy messages into restricted time periods. They soon become better communicators, which makes for better learning. Faculty also are forced to re-evaluate their visual materials (slides, overhead transparencies, charts, and so forth). The horizontal television screen means vertical slides cannot be used. To get large enough letters on the screen also means using only a few lines of type. Most presenters try to cram too much into their visuals.
- More attention needs to be given to the learning environment at downlink sites. Furthermore, it is unwise for presenters on satellite to refer to materials that viewers may not have.

Whiting (1988: 21-22)

It is interesting to note that Dean and Hosie (1985: 343) suggest that it is debatable whether in fact, the addition of a visual component to teleconferencing enhances the communication. These authors feel that, in some cases, visuals can act as distractors, a sentiment that was echoed in the data collection below.

The equipment

The technology involved in this trial used the familiar telephone and television at the learner interface, but was in reality quite complex, requiring a large number of personnel for it to be implemented. The production team in the Adelaide College Studio, produced the live television program, which was transmitted to the Telecom Operations Centre by fibre optic cable (a high quality transmission medium). It was then relayed to the ABC at Collinswood, which relayed it to the Aussat earth station at Regency Park which, in turn, linked it to the satellite for reception by Imparja. Imparja then provided the specific B-Mac encoding information so that the program could be received only by the TAFE receiving dishes in the participating communities. It was then despatched to the satellite again for reception in the communities (Schick 1989a: 5).

The Australian national satellite communications system (AUSSAT) consists of three satellites placed in geostationary orbit above the earth. Each satellite has fifteen transponders or amplifiers (4 high power 30W, and 11 low power 12W) configured to cover Australia with a series of beams or *footprints*. Two of these beams are national beams capable of receiving signals from anywhere in Australia. There are two other national beams for Australia-wide transmissions and four spot beams for covering particular areas of the country. South Australia shares the Central Australia beam with the Northern Territory (Kirk 1986: 17).

The teleconferencing facilities comprised several microphones with *press to speak* facilities, and the telephone was heard through a loudspeaker. Each of the communities was able to hear and speak to each other through the DUCT system. In Adelaide a teleconference *bridge* was used to bring all the sites together so that they could communicate with one another. The bridge's output was fed to the presenters in the studio through a loudspeaker. However, the presenters' conversation did not pass through the telephone system. At the remote sites, the participants heard one another through DUCT, and they interacted with the presenters via television. **Figure 6.2** shows some of the students taking part.

Figure 6.2: *Aboriginal students taking part in the Interactive Television Project at the TAFE facilities at Indulkana*

The television series

Initially, the project was to produce a series on Community Management. The topics included concepts, training programs, income and expenditure, and writing submissions and letters. These were decided in liaison with the staff in the Aboriginal communities. However, following audience response and feedback after the initial programs, the approach taken for the final programs was more flexible with the needs of the viewers kept in mind. The topics included educational opportunities in Adelaide, going to Adelaide to study, Nganampa health, meeting procedures, knowing your legal rights, and football skills.

From the administrator's perspective

The administrator with whom the evaluation criteria were discussed was the manager of the Interactive Television Project. His background is in the development of educational technology and instructional design, with a particular interest in interactivity. He rated all the criteria between five and seven, except for costs which was rated 2 as not reasonable. See **Table 6.1** for the ratings.

Table 6.1: *Ratings of interactive television on seven criteria from an administrator's perspective*

Criteria	Rating
Objectives	5
Outcomes	6
Approach	7
Access	7
Management	6
Service/Support	6
Costs	2

Objectives and outcomes

It was noted that the project did not set out to achieve an educational end. As the project was a trial, it was conducted primarily to "determine whether interactive TV/Voice technology is effective in delivering open learning programmes to a given student group" (Schick 1989a: 2). The administrator said that they had an idea of the content that was wanted but this changed as the trial proceeded. Consequently the rating for Objectives was considered quite important (Rating 5).

Outcomes of the trial, in the view of the administrator, were satisfactory (Rating 6). The technology could not be compared with other equipment or materials as it has not yet been significantly used or tested. However, the administrator did think that the use of this technology expanded TAFE's technological repertoire and as such the outcomes could be considered satisfactory.

Considering the effectiveness of the technology, the administrator quoted the use of interactive television for the provision of distance education in Canada for nearly a decade. (A brief outline of the the situation in Canada is presented in Chapter 3). By providing both visual and aural interaction, it was thought that more learning could take place.

Approach

Approach was rated as very supportive (Rating 7). The administrator thought that the technology offers new approaches to learning but that opportunities were missed in illustrating the expanded options available. Quite often, for instance, the visual support was through photographs or graphics which could easily have been used in a print media form. One of the fundamental benefits of interactive television is the ability for participants to interact not only conversationally, but also with the images that are transmitted. Questions such as "Show me how to do that again" or "What's that big spring for?" were rarely made.

Television certainly enables educational activities that other technology cannot, the administrator thought. Students who would not ordinarily have access to people or information can with satellite television. Mixed responses, however, were received from teachers, especially those who were directly involved in the presentation of the program each week.

Access

Through interactive television, students will have greater access to learning. The technology was seen as being useful for a wide range of students. A large group could be served at one time. It was felt that cost should not preclude students since the costs would be the same for a student located in an adjacent suburb to the television studio as for a student located in a remote community. Cost to the student would be indirect as the administrator saw it. He did not see that any student would be precluded from using the technology for cultural reasons, and he cited the specific instance of this trial where the Aboriginal communities were invited to take part, and the response received from the communities in the considerable numbers of people watching each program.

Management

The Management of the technology was also rated highly (Rating 6). The administrator commented that the technology does need specialist assistance for it to be installed but once set up it was a simple matter for students to activate the receiving dish and operate the television and the DUCT equipment. It is not at all time consuming to set up the equipment or to shut it down; it requires, simply, turning on a television and making a telephone call in order for a connection to be made. The services of a technician should only be required in the case of equipment malfunction.

Quite obviously interactive television is designed for large numbers of people rather than individuals. It also required a large number of personnel to produce the program during the trial but this could be significantly reduced for an on-going series.

Service and support

Service and support would clearly depend on whether a decision was made to extend the trial. Certainly, in the development of the technology, specialist advisory staff have been trained but they may not always be available. The administrator did not think that further modifications would make the current technology obsolete. He also stated that updated versions would be made readily available.

Costs

Costs was the only criterion not to rate well (Rating 2). The administrator stated that costs were not primarily capital, but were mainly in the production and delivery of the technology. In terms of personnel costs, these were clearly high for the trial. Twenty people had been working together on the Project, although it was estimated that four people could successfully operate the technology if production were regular.

The administrator could also foresee substantial training costs before the technology could be used effectively. Schick (1989b: 5) in his report states that the entire program can be operated by a presenter who displays pre-prepared graphic cards and plays pre-cued video segments to support a topic. The presenter would therefore need training in the operation of equipment and presentation on camera. On-going costs for servicing were considered to be minimal but there would be on-going costs for materials and these would depend on the needs of the course. There would not be any savings if the technology is used, he said, but it would provide new opportunities for access.

The major obstacles to be overcome in the implementation of narrowcast television were considered to be the cost effectiveness of the learning, and the use of appropriate learning methodologies that make the interactivity valid. However, the administrator was confident that "interactive television would become a viable addition to the repertoire of an open learning environment" (Schick 1989b: 8), once recurrent costs (e.g. satellite charges, support personnel), which are the major barrier to its use, are reduced to the acceptable level of other established courses.

From the teacher's perspective

The teacher interviewed for this study was one of the presenters of the interactive television series. She had had a long involvement in Aboriginal education and was chosen as a presenter because she had experience in using DUCT teleconferencing, and was known and accepted by the Aboriginal communities. She had mixed reactions to interactive television as a learning environment, and this is reflected in the way she rated it on the criteria (**Table 6.2**).

Objectives

The teacher thought that educational objectives were not clearly stated but acknowledged that the trial was less of an educational program than of technology and equipment. One objective had been that students' learning be facilitated, but the teacher did not think that this had eventuated. The technology that the students were to become familiar with was the DUCT telephone. The teacher did not think much thought had been given to the way the students needed to learn how to use television for learning, in the planning of the project. However, as the trial progressed, interaction was initiated by *chatting* by DUCT before the narrowcast commenced, so that the interaction was more easily maintained once the televised section of the program began. This was done to try to overcome the students' natural response to television of simply watching it.

Outcomes

Outcomes was rated satisfactory (Rating 5). The teacher considered it was difficult to determine whether the technology was effective in meeting its aims and objectives mainly due to the nature of the group. However, she thought it was effective and would be used primarily to provide for learning in remote areas. She added that she wanted to see learning be even more interactive.

The teacher felt that DUCT was more effective than narrowcast television. She thought that television had been considered only for its entertainment value for so long that most students found it difficult to approach it with an attitude of learning. Television has also been a passive medium in the past, and students initially did not interact because of the past experiences. Even when encouraged to interact, there was a certain hesitancy. The DUCT system means that students have to concentrate on listening for their learning. Interactive television introduced a visual element which she thought might work as a distractor, especially as it was often simply the visual of the person speaking, rather than visuals illustrating what was being said. Her conclusion was that DUCT was quite capable of achieving similar outcomes in conjunction with printed materials, for a fraction of the cost.

Table 6.2: *Ratings of interactive television on twelve criteria from a teacher's perspective*

Criteria	Rating
Objectives	4
Outcomes	5
Approach	2
Interest Level	4
Appropriateness	4
Flexibility	4
Adaptability	4
Learning	3
Familiarity	4
Portability	3
Convenience	5
Ease of Use	3

Approach and interest level

Approach was rated very lowly (Rating 2). The teacher felt quite strongly that the technology, as it was used in the project trial, did not reflect current thinking on language or the development of literacy. Nor did she think that it was acceptable to a majority of teachers involved in the project. She also strongly intimated that the technology was not compatible with her own approach to language or learning.

Interest was rated as neither high nor low (Rating 4). The teacher stated that she does not want to use this technology but, conversely, there seemed to be quite a high level of interest amongst the students.

Appropriateness

Appropriateness of the technology was also rated neutrally. The teacher commented that there were not effective or appropriate teacher support materials available as they were not developed as part of the trial. She did not think that the technology allowed students to make any choices about their learning: essentially the technology controlled the style of learning, the pace of learning and the time of learning, and the student only had flexibility in the amount of interaction that they wished to make. In this situation, the technology became the teaching environment, not a tool within the environment.

In considering how appropriate it was for students to be using the technology at this time, the teacher stated that she thought that it was a bit advanced for the learning that they predominantly needed. Most students were concentrating on improving their oral or written literacy, and the teacher felt that the use of the DUCT system was adequate for meeting those needs at present. Consequently, she felt that the technology did not assist the students with their learning objectives.

Flexibility

Flexibility of the technology was similarly rated neutrally with a rating of 4. The teacher commented that the technology could not be easily integrated into the classroom. She did not think that the technology as such could be adapted for use with different levels or abilities of students, but that the methodology used in teaching students could be changed according to the levels and abilities of those students.

The teacher felt that the technology did have a wider application than was originally intended as it has been demonstrated that it can be used to deliver education to students in remote communities. She was not sure if the technology could be used with other equipment to extend its flexibility, and was likewise uncertain as to whether the technology was flexible enough to allow adaptation. This perhaps reflects the lack of familiarity that the teacher had with the technology.

Adaptability and learning

The teacher felt that she was insufficiently familiar with the technology to be able to say whether it could be used without modification. Hence, the rating of 4. However, she thought that she would prefer not to use it unless it had been modified. The teacher found that the technology could not be used by students in the same way as by teachers, and therefore the development of materials had to be done very carefully. The teacher also thought that the educational content of the learning materials needed to be adapted by a specialist rather than a teacher with only limited experience in the field of technology. The teacher did not think that the technology was modifiable to different student needs.

The learning that the technology facilitated was rated poorly as fairly passive with a rating of 3. The teacher thought that the technology did allow students to interact with the material, but that students were not able to learn at their own pace, or at a time convenient to them, or in a style that suited them. She felt that even though the technology was supposed to be interactive, the response of students to the medium was generally passive. This could be due to the fact that television has been a passive medium for so long that students found it difficult to use it interactively.

Familiarity

The teacher's experience was that she needed to be familiar with a technology to use it effectively. She said that teachers involved in the presentation of the material were not sufficiently prepared to use the technology and that it really was a case of being *thrown in the deep end, to either sink or swim*. She also thought that students needed to be more familiar with the technology to make the best use of it. Familiarity with narrowcast television was thus rated neutrally (Rating 4).

Portability and convenience

Lack of portability was seen as a limiting factor (Rating 3). The equipment cannot be readily transported to a situation where it is needed since this would involve removing the satellite receiving dish and making intricate adjustments for it to receive signals at its new location. This requires specialist training. The technology could be used at home if it were available for that purpose, but the expense would be very high. As to whether the technology can be set up by a teacher or whether it needs the services of a skilled technician, the teacher thought that if the receiving dish was in place, then it would be a relatively simple matter for the teacher to set up the equipment for student use. However, if the teacher was required to set up the equipment for transmission, a skilled technician was required.

In terms of convenience, a rating of 5 was given on the grounds that the technology was not very time consuming for students to access, and that some students would be able to set it up once they were shown how to do it.

Ease of use

The technology was rated difficult to use (Rating 3), and it often left students and teachers feeling bewildered, the teacher said. She thought teachers had received inadequate preparation and that it would take a long time for them to master the technology fully. The technology could not be effectively used without having a complete mastery of it.it was stated. The teacher also thought there was insufficient documentation, which meant new ground was being covered for most of the trial.

Overview

Many of the teacher's comments reflect her dissatisfaction with the trial and not necessarily with interactive television. In her opinion, a lot of work needs to be done before this form of technology would be an effective learning medium. Research into the educational benefits of television, and how to achieve these is limited. The transition from television as a passive medium to the use of television as an interactive medium needs to be addressed. More effective methods to promote interactivity need to be sought, and the addition of suitable visuals that cannot be replicated in printed material is necessary. The teacher thought that the biggest problem with the technology was the huge cost to simply add the visual dimension to teleconferencing. She was not sure that it was an appropriate use of the technology at this time.

From a student's perspective

Because of the difficulty of interviewing participants in the Interactive Television Project, no students were spoken to directly. Therefore, any comments used have come from other sources. A response written by one of the DUCT teleconferencing students is included in **Panel 6.2.**

Panel 6.2

Talking to Lorraine on TV

Today we were watching TV about Nganampa Health Council and we saw Lorraine, Nora and Robert. They were talking about the houses, without hot water, then they were talking to Oodnadatta, Amata, Indulkana, Coober Pedy and to Ernabella. They were talking how the children got sick from rubbish, sweet, sugar, chocolate. Alec was talking about the olden times. We saw Lorraine in TV and we are going to talk to her tomorrow and the TV was good.

Colleen
School of Aboriginal Education, 1989

Conclusion

Television and telephones are familiar everyday objects, but the Interactive Television Project conducted by the Adelaide College of TAFE gives a new perspective on this technology which is both innovative and may have educational benefits beyond those of audio teletutorials.

The North American experience has found ways of overcoming the extremely high costs which at this stage is the prohibiting factor for implementing this technology in Australia. The lessons learned in using this technology in the U.S.A., particularly the use of high quality graphics, and the importance of using the medium to demonstrate that which cannot otherwise be learned by printed materials, is corroborated by the administrator's comments. The administrator also envisioned that the technology should be able to facilitate learning that could only be learned by actual experience, which could not take place due to lack of access, expertise or opportunity.

The key teacher involved had decided reservations about the technology, but these could have been due partly to the sense of inadequacy in using a new delivery medium. She was hesitant about completely denigrating the use of interactive television as a mode of delivery. However, she did make some sound suggestions to research the educational value of interactive television. She also thought that teachers using the technology need to have inservice training in using the medium, particularly in presentation, a recurring theme noted in the review of literature from North America.

It is somewhat difficult to gauge the response to interactive television from the students with only one instance in hand. However, psychologists have been suggesting that learning is more effective the more senses that are engaged. Being able to talk about what is seen on the screen, rather than only having the opportunity to talk via teleconferencing could therefore be beneficial. Whether that effectiveness extends to viewing *talking heads* is arguable, and needs to be researched.

In evaluating interactive television as technology suited for use for adult literacy, it can be said that the technology is very expensive at this stage; it has problems for students who have previously viewed television as entertainment, and who are unused to interacting with a presenter whom they can see on the screen. This should not, however, deter educators in exploring the technology further to determine its full potential, and to overcome the problems of expensive production costs. The art of presentation of appropriate graphics and action material, and the methodologies of learning through this medium, also need to be addressed. It is to be hoped that in the current economic climate we will still want to develop new learning environments that will carry us into the 21st century.

7 CASE STUDY:

Lexiphon – A New Literacy Tool for Trade Training

Background to case study

This case study focuses on *Lexiphon*, a new Australian invention that has application to literacy teaching, foreign language learning, and even teaching of music. Unlike the other case studies contained in this volume, the present study is largely limited to describing the main features of the Lexiphon system so that adult educators might be aware of this educational tool. So new is Lexiphon that it is yet to be formally trialled with adult learners. Therefore, although the Chapter title suggests Lexiphon may be a literacy tool for trade training, the preparation of trade materials was still underway at the time of writing this report with formal trials planned for later in 1990. Lexiphon has generated a degree of interest among those who have seen the prototype model demonstrated. This study describes Lexiphon and the associated learning materials with a view to estimating its potential, using in part the framework presented in Chapter 2.

What is Lexiphon?

Imagine you are reading and come to a word you do not know. It may be a word that you are familiar with in an aural context. If you were able to hear the word, or even part of the word, this may be all you need to comprehend as you continue reading. Lexiphon is designed to provide that audio help.

Devised in Sydney by Dr Trevor Lloyd, the Lexiphon system uses computer-based technologies – chips and circuits – but hides the computer. Like familiar home sound systems, the Lexiphon system comprises several components. First, there is a Compact Disc player which differs only slightly from off the shelf models by the inclusion of minor additional circuitry. The CD player is connected to a pair of stereo speakers. The innovation that transforms this from part of a home entertainment system to a new learning tool is a *black box* of electronic circuitry, the Lexiphon interface. The final piece of hardware is a digital light pen or wand about 15 cm. long, similar to that used at supermarket checkouts, which is connected to the CD player via the *black box*. The various components of the Lexiphon system are shown in **Figure 7.1**.

Hardware by itself is just that – bits of wire, metal and plastic. What makes hardware potentially useful is accompanying software. The software for Lexiphon consists, on the one hand, of a compact disc similar to CD audio discs and, on the other, of specially prepared reading materials which may contain text, diagrams, or musical notation. The difference between *book text* and the text used with Lexiphon are the bar codes which are typically positioned beneath words (or alongside diagrams or music).

To use the Lexiphon system, readers turn pages as in book reading. Holding the light pen in their hand, they can stroke any barcode to hear audio signals, which may be voice, music or any other sound stored on the disc in the CD player. The whole system works in very much the same way that product information is accessed at the supermarket checkout when goods are passed over a light source.

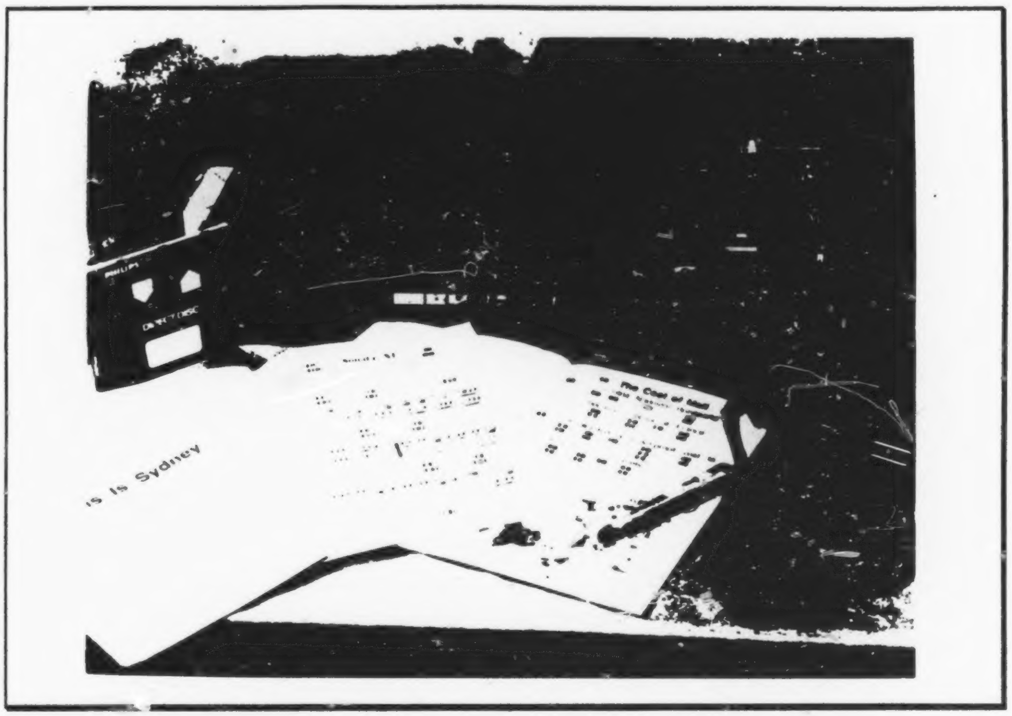


Figure 7.1: *Lexiphon learning system – coded books, digital light pen, interface, and modified compact disc player with specially prepared compact disc*

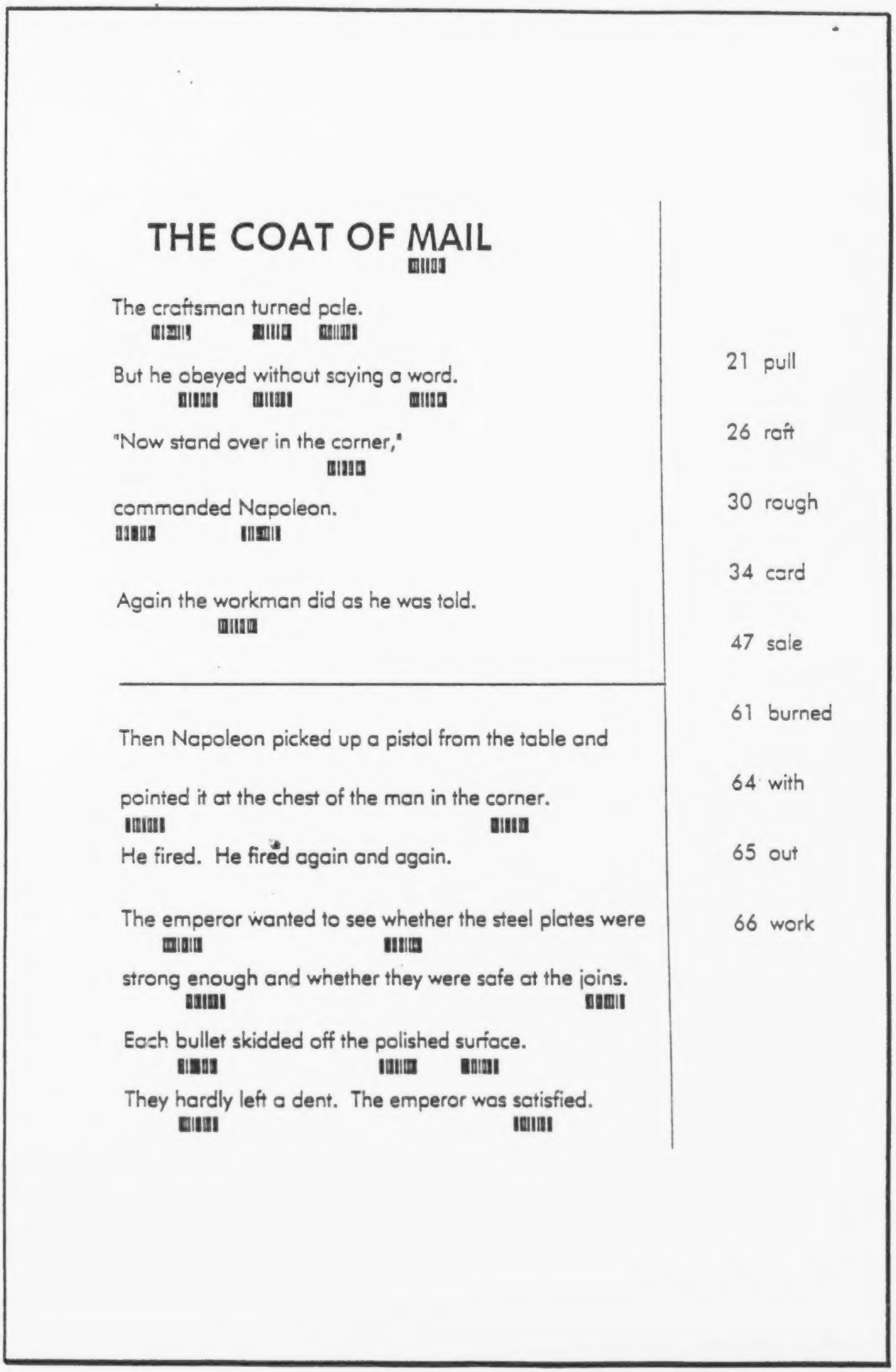
Lexiphon literacy materials

The prototype Lexiphon literacy materials include a short story called *The Coat of Mail*, an excerpt of which is shown in **Figure 7.2**. Barcodes under selected words provide audio clues which can take a variety of forms. Sometimes the word is spoken in full. At other times the first sound of the word may be given followed by a beep, or a beep followed by the final sound, or in fact any other combination. Another form of clue is to provide the sound of a closely similar word appearing in the margin (these words have reference numbers – see Figure 7.2 – which are also spoken to make it easier to locate them). Clues may also provide word meanings.

The system works by providing help with certain words or concepts. Readers activate this help as necessary by holding the pen upright so that the light is on the barcode. A quick skim across the barcode serves to access the exact location of the word's spoken representation on the compact disc as well as its duration. What the user then hears is not synthesised computer speech but a normal human voice saying the word with clarity and the exact contextual intonation. The action may be repeated any number of times. The Lexiphon system, in this case, has been activated at the word level.

Lexiphon literacy materials can be activated at a number of levels: story, sentence, word, morpheme, syllable, phoneme. This is achieved by addressing different size sound segments, each with its associated barcode. For example, a sentence such as the following could be coded on disc:

> "How do I pay for this present?" he asked.



THE COAT OF MAIL

The craftsman turned pale.

But he obeyed without saying a word.

"Now stand over in the corner,"

commanded Napoleon.

Again the workman did as he was told.

Then Napoleon picked up a pistol from the table and

pointed it at the chest of the man in the corner.

He fired. He fired again and again.

The emperor wanted to see whether the steel plates were

strong enough and whether they were safe at the joins.

Each bullet skidded off the polished surface.

They hardly left a dent. The emperor was satisfied.

21	pull
26	raft
30	rough
34	card
47	sale
61	burned
64	with
65	out
66	work

Figure 7.2: *Sample page from a coded story called The Coat of Mail (by Trevor Lloyd) for use with Lexiphon*

An address on the compact disc could be given to the whole sentence, another to the word *present*, another to the phoneme /p/ in *pay*, another to the word *do* because it has, say, a different sound to the same word *do* in a different context. The word *I* may be used elsewhere in the story and since it sounds similar in both contexts, it could be assigned the same address. This procedure saves on disc space.

The compact disc is specially pressed to support the reading materials. The disc capacity is 74 minutes of stereo sound (148 minutes mono). This is a read-only disc which costs approximately $4000 to press (not including the preparation of the master tape). Once pressed, further copies can be made quite cheaply.

Language exercises and activities are relatively easy to produce with the right equipment. **Figure 7.3** shows one such exercise being prepared using an IBM PC and ink jet printer. The software being run is FLIPS which generates barcodes. The inventor of Lexiphon, Dr Lloyd, is pictured indicating the barcode addresses for accessing the words on the compact disc. What is important to note is that teachers can develop whatever exercises they choose using the sound resources of an available coded compact disc.

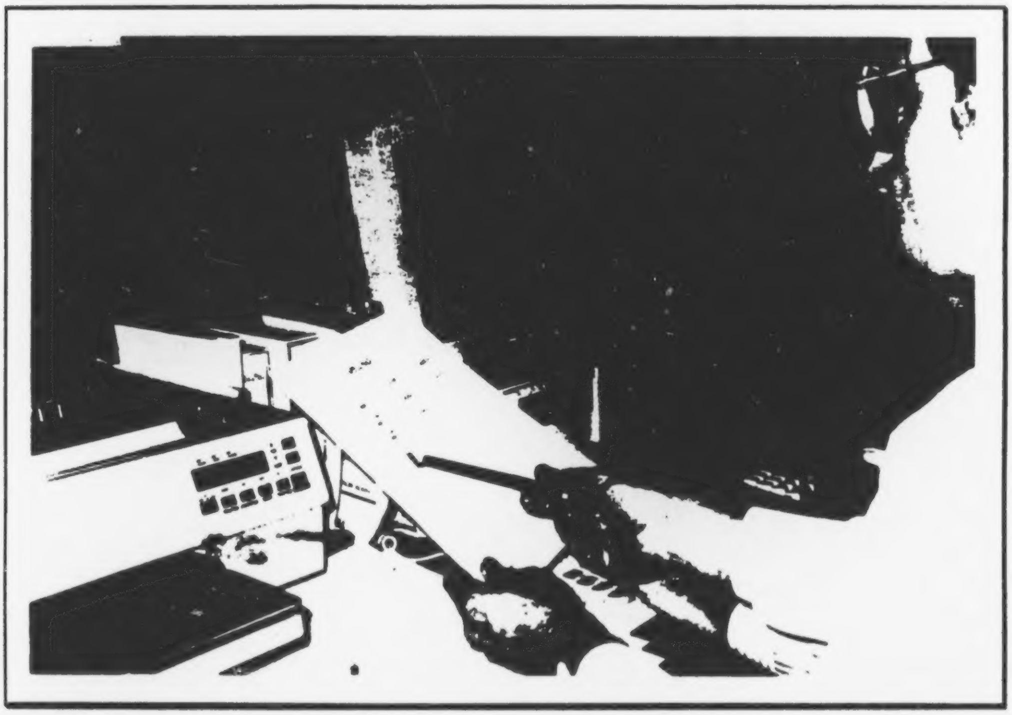
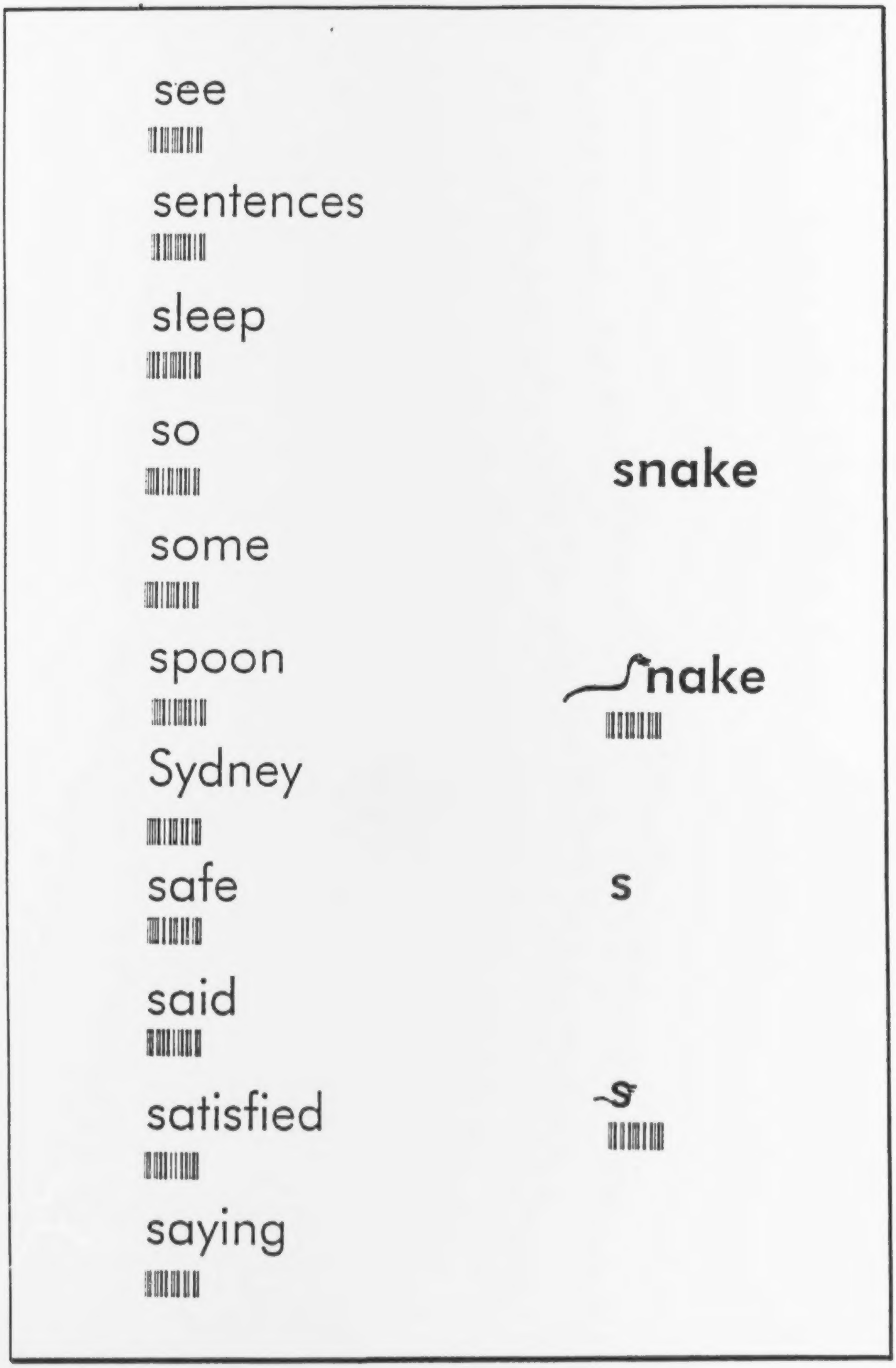


Figure 7.3: *Preparing Lexiphon literacy materials using a microcomputer and printer*

Literacy materials may include different kinds of language exercises. **Figure 7.4** illustrates, for instance, a page of spelling exercises. Presuming teachers wish to generate exercises to practise the initial /s/ sound, students can use the sheet to hear the individual words on the left-side of the page by stroking the barcodes or, if they wish, they can hear the initial sound of these words by stroking the barcodes on the right-hand side of the page. Similar pages could follow for other initial sounds, say, /m/ and /f/. **Figure 7.5** provides an example of a follow-up spelling activity where students fill in the missing letters.



see

sentences

sleep

so

some

spoon

Sydney

safe

said

satisfied

saying

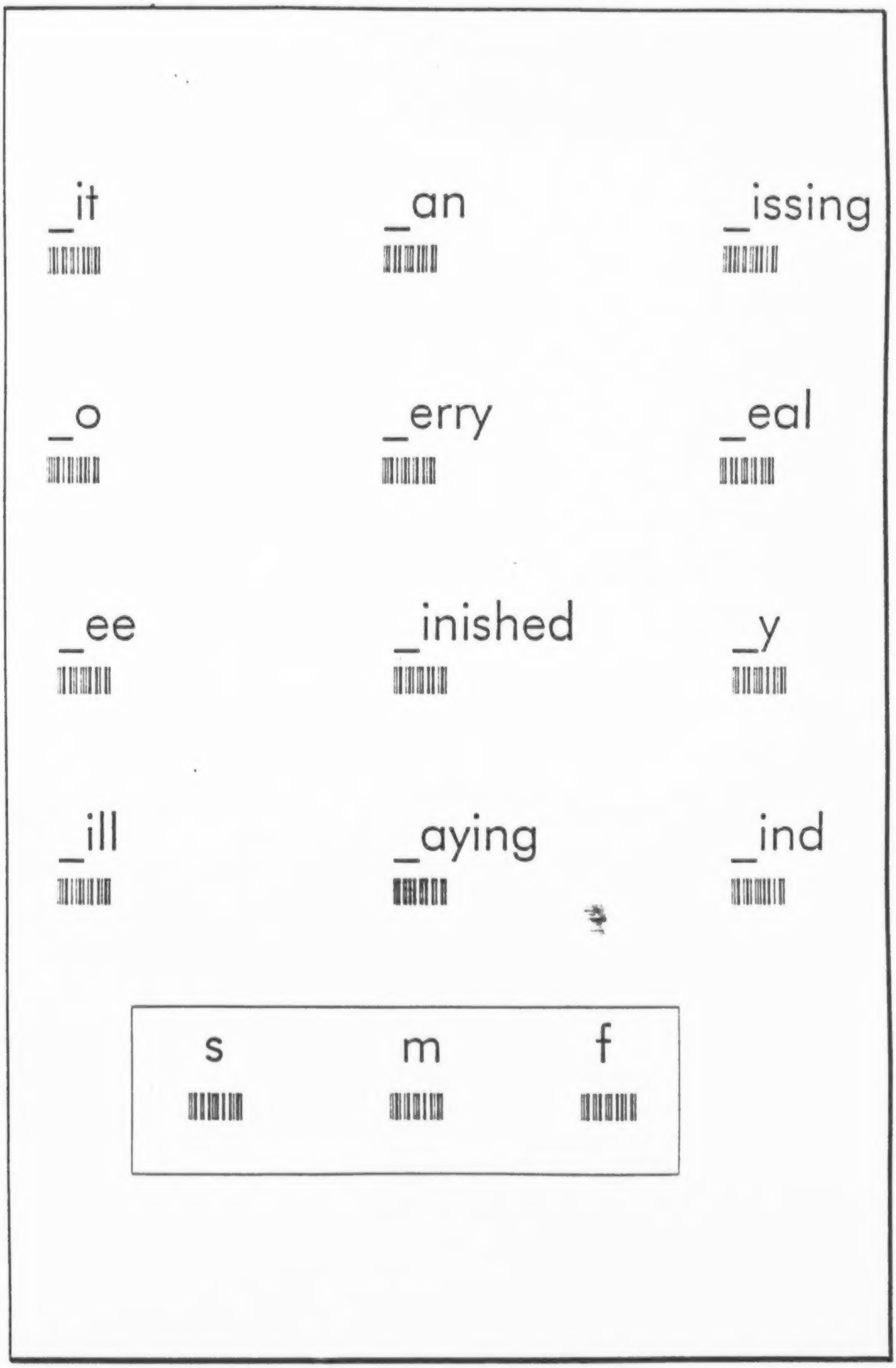
snake

snake

s

s

Figure 7.4: *Sample spelling exercises for use with Lexiphon*



_it _an _issing

_o _erry _eal

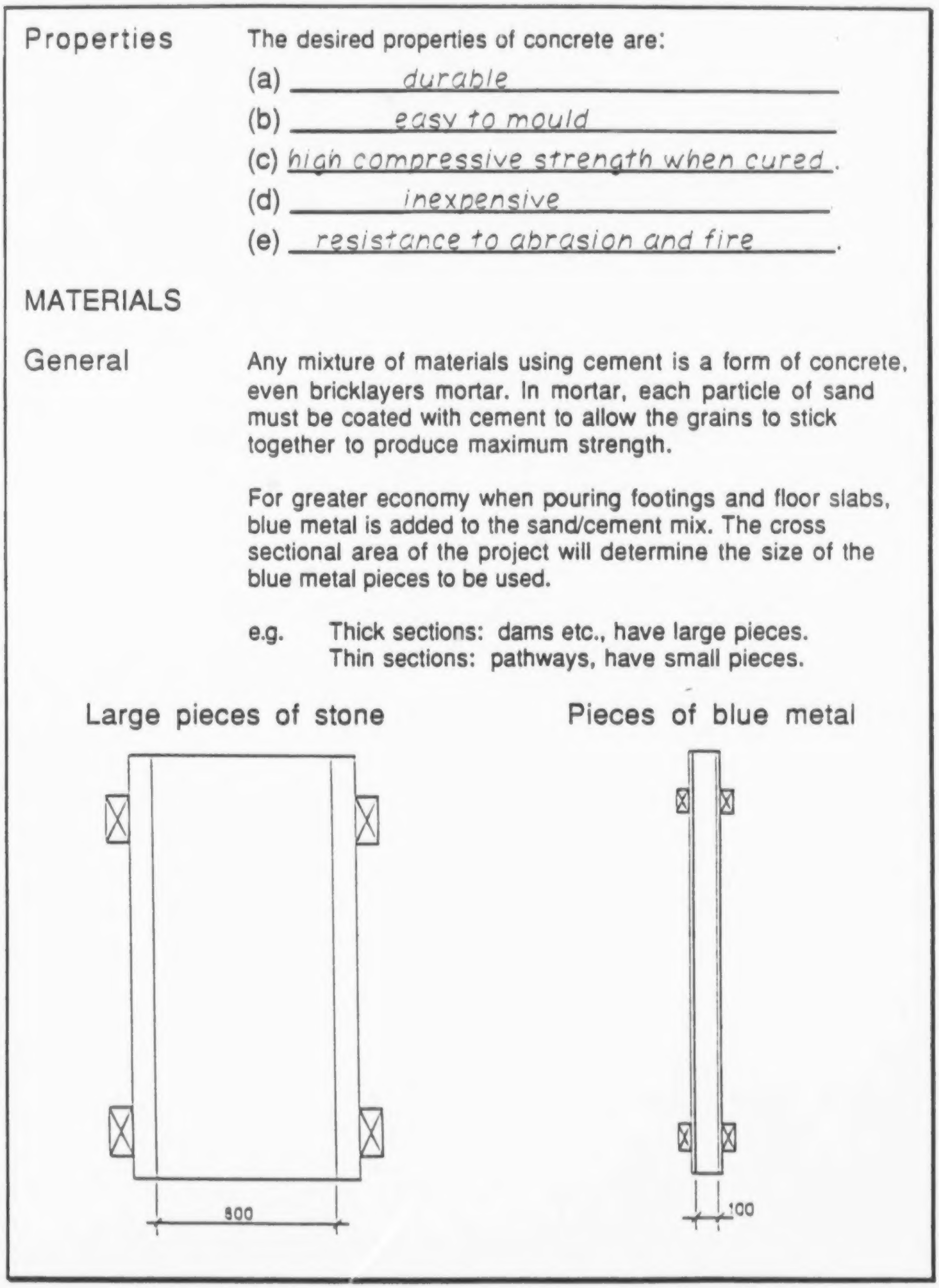
_ee _inished _y

_ill _aying _ind

s m f

Figure 7.5: *Spelling activities to accompany the spelling exercises in Figure 7.4*

To indicate other possibilities for Lexiphon learning materials, **Figure 7.6** shows a typical page from a trade text. One of the barriers in reading such texts is technical vocabulary. Students can get assistance with many of the words on this page using the digital light pen and stroking the corresponding barcodes illustrated in **Figure 7.7**. Note there are two levels of assistance indicated by the icons in the right margin – a seated bricklayer for *easy* level (more help) and a standing bricklayer for *difficult*.



Properties

The desired properties of concrete are:

(a) durable

(b) easy to mould

(c) high compressive strength when cured.

(d) inexpensive

(e) resistance to abrasion and fire.

MATERIALS

General

Any mixture of materials using cement is a form of concrete, even bricklayers mortar. In mortar, each particle of sand must be coated with cement to allow the grains to stick together to produce maximum strength.

For greater economy when pouring footings and floor slabs, blue metal is added to the sand/cement mix. The cross sectional area of the project will determine the size of the blue metal pieces to be used.

e.g. Thick sections: dams etc., have large pieces.
Thin sections: pathways, have small pieces.

Large pieces of stone

Pieces of blue metal

Figure 7.6: *Sample page from Lexiphon booklet on bricklaying*

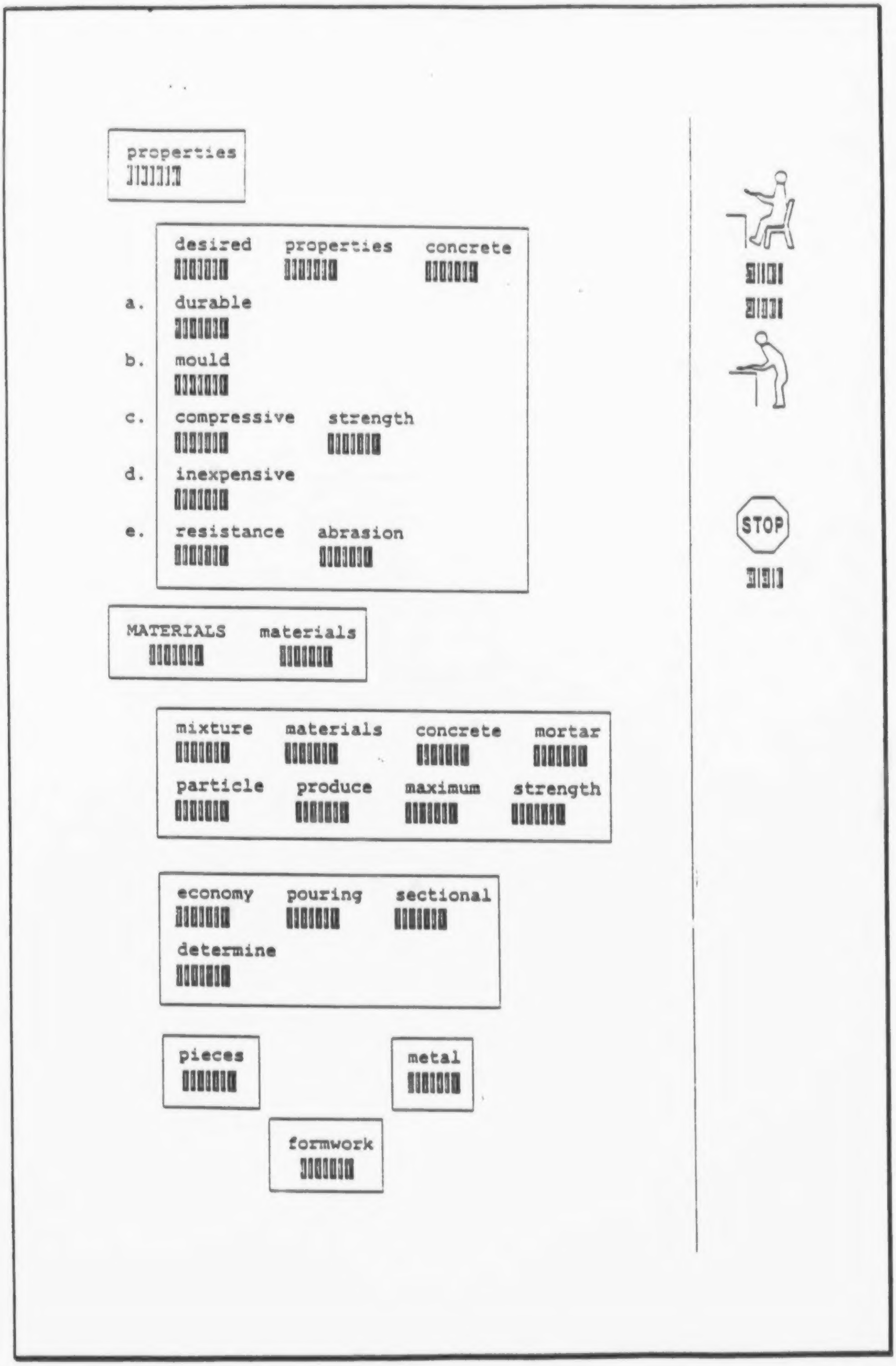

properties
desired properties concrete
a. durable
b. mould
c. compressive strength
d. inexpensive
e. resistance abrasion
MATERIALS materials
mixture materials concrete mortar
particle produce maximum strength
economy pouring sectional
determine
pieces
metal
formwork
STOP

Figure 7.7: *Two levels of help provided by Lexiphon for text in Figure 7.6*

What has been written about Lexiphon?

Very little to date has been written about the Lexiphon learning system, due in part to the developmental nature of the research. The earliest paper to have a bearing on what is being described in this case study was prepared by the inventor in 1985 (Lloyd 1985). Although Lexiphon is not mentioned in this article, a model of phonological synthesis (called by some *phonic blending*) is developed as part of the wider communication process. This paper presents some of the theoretical notions underpinning Lexiphon.

Later, in 1986, Lloyd began work on a *learner-managed technology* project as part of post-graduate studies within the School of Education and the School of English and Linguistics at Macquarie University (Lloyd 1989). Part of the theoretical work revolved around lexical access theory, or the way spoken cues might serve as prompts in the reading process. At the same time, Lloyd was working with functionally illiterate adults in a maximum security prison. Out of these twin experiences came the idea of a device which learners could manipulate, and so Lexiphon was conceived.

Besides these two papers, a series of submissions has been prepared by the Directorate of Special Programs within the NSW Department of Technical and Further Education. These are not public documents although full access was given to us in conducting this case study. In broad terms, the plan is to develop language and literacy materials, in book and compact disc form, in the following areas.

First, a series of textbooks (*In Touch Putongua*) for teaching Chinese to adult English speakers studying at the tertiary level is envisaged, as well as a similar series (*In Touch Nihongo*) for teaching Japanese to beginners. Both series are to incorporate book and compact disc with human voice, music, song and sound effects. Further materials modelled on these could be developed for those wishing to acquire fluency in other Asian languages.

Second, a series called *In Touch New Horizons* is proposed based on the Lexiphon learning system for those adult newcomers to Australia from non-English speaking backgrounds as well as for adults in Southeast Asia who may wish to acquire skills in speaking, reading and writing in English.

Third, a language series under the general title *In Touch 2000* is aimed at those adults in the community who, for whatever reasons, have failed to master basic literacy skills. These might include students in trade or basic education courses at TAFE Colleges, adults in the general community wanting help in reading, writing or spelling, or functionally illiterate adults in prison or youth detention centres.

Fourth, a start has been made on developing Lexiphon materials specifically for students with reading or writing difficulties who are studying for the bricklaying and vehicle trades at TAFE Colleges. At the time of writing this Report, the compact disc was pressed and plans were being made to evaluate the learning materials formally during 1990.

In addition to printed materials, two parallel videotapes have been produced by the Directorate of Special Programs of the NSW Department of Technical and Further Education. Entitled *Lexiphon*, these two videos, one in Chinese and the other in English, show students using the Lexiphon learning system. The tapes run for about ten minutes.

Trial of Lexiphon

No formal evaluation of Lexiphon materials has yet been conducted (beginning of 1990). At this time only the one Lexiphon system is available anywhere and it is has been used largely to demonstrate the potential of the technology to bodies such as the Curriculum Development Centre in Canberra, the Asian Studies Council, Universities, and some Departments of Education and Departments of Technical and Further Education in certain states. It was demonstrated, too, at the joint conference of the Australian Reading Association and the English Teachers Association in Darwin. Gradually, then, more adult educators have acquired at least a passing acquaintance of Lexiphon.

Besides the demonstrations noted above, the Lexiphon system was placed in the Special School attached to Macquarie University for use by selected students there. As part of this case study, observations were made of four of these students. Each of the students entered the room adjacent to their classroom where the equipment was set up, confidently and with a degree of importance. Although this was only the second occasion each student had used the equipment and materials, all knew how to operate the wand to activate the spoken words from the page. All happily wanted to take home *the paper that talks to you.*

Figures 7.8 and **7.9** picture two of the children (called here David and Vonni) operating the equipment. David is using the spelling exercises described above. With the wand, he strokes the barcode under the word:

__ a ___

Lexiphon responds *lamp* and David fills in the missing letters on his work sheet. On the next page, David fills in all the missing letters: l a m p. Two advantages of Lexiphon are that he works at his own pace and can have the words repeated as many times as he wants. Vonni has a minor muscular problem which is evident in the way she holds the wand (Figure 7.9). On the previous week she experienced quite a lot of difficulty tracing over the barcodes, taking up to five passes before Lexiphon responded. On this occasion, the barcodes on her work sheet have been made much *taller* and she successfully has the words spoken first time on nine of every ten passes of the wand.

Features of the Lexiphon system

As part of the case study, lengthy discussions were held with the inventor and developer of Lexiphon, Dr Lloyd, and with others in the Directorate of Special Programs of NSW TAFE, as well as with other adult educators who had seen Lexiphon. Since no formal trials of Lexiphon have taken place, other than the informal observations noted in the previous section, it was not possible to seek the opinions of teachers or students. For an administrator's point of view, we asked Dr Jennifer Cameron, Director of Special Programs (NSW TAFE) for her views, using the framework presented in Chapter 2. Discussions were held also with Marian Norton from the Queensland Department of TAFE and with Professor Clark, Pro Vice-Chancellor of research at Macquarie University. What follows is an amalgam of these discussions, observations from site visits, and views expressed in documents relating to Lexiphon.

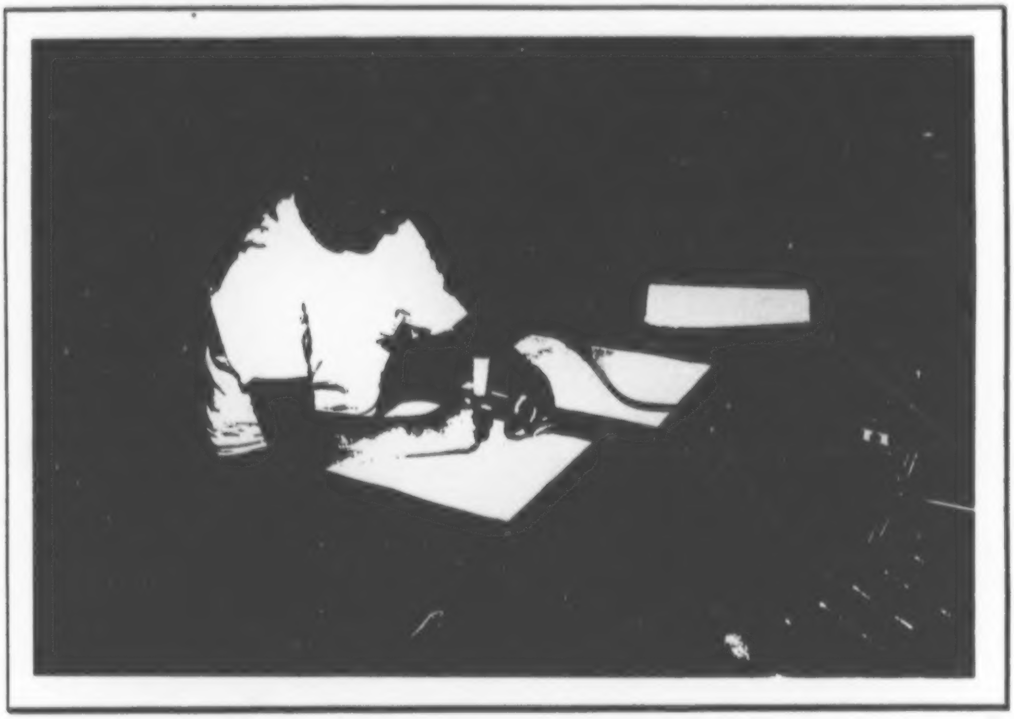


Figure 7.8: *David practises his spelling with Lexiphon*

Figure 7.9: *Vonni with her muscular problem finds the taller barcodes easier to use*

Objectives and outcomes

The objectives of Lexiphon were considered to be clearly stated, according to Lloyd (1989), in an article in a themed issue on literacy in a complex society, in the Journal *Unicorn*. Above all, it is argued there that Lexiphon gives learners a degree of autonomy: it provides the opportunity to work at one's own pace, to repeat as often as necessary for learning, and to work with familiar materials (that is, books) in a way that is comfortable to the individual. Objectives received a rating of 7 (see **Table 7.1**).

Table 7.1: *Ratings of Lexiphon on seven criteria from the perspective of administrators*

Criteria	Rating
Objectives	7
Outcomes	6
Approach	5.6
Access	7
Management	7
Support	6
Costs	6

In comparison with other equipment, Lexiphon was judged quite favourably for outcomes (Rating 6). For instance, it is easy to use and it combines rapid, random access of synthetic speech "with the best sound quality of the audio-tape systems". It was acknowledged that research was not yet available regarding the effectiveness of Lexiphon as only prototype materials are currently available. However, it was stated:

> *... the equipment has been well received by the limited number of students and adults given the opportunity to use it for short periods. There is good reason to believe the technology will be attractive to students because of the independence and ready support it offers and its openness to individualisation.*

Methodology and approach

The methodology and approach underlying the Lexiphon learning materials is likely to generate controversy among language educators. On the one hand, there are those who, favouring a whole language approach, feel the materials place an over-emphasis on phonics. This view was put in the following terms – and defended:

> *Concern has been expressed that Lexiphon encourages an overly analytical view of reading because of sounding out words. However, ... a philosophy of whole language and contextual reading strategies could fit perfectly well with its use. Only one CD has been prepared at this stage. If material were to be specially written for adult literacy, script*

> *writers could be advised accordingly. ... The sounds on the disc were not exaggerated or excessively phonic in orientation.*

In support of this view, another comment made was that the materials were eclectic in their approach and could be used to advantage by teachers with varying philosophical approaches to literacy.

A different point of view again was that Lexiphon offers a new technological approach to the old method of reading on mother's knee or the neurological impress method, with Lexiphon providing ample opportunity for practice. Front-line teachers, it was suggested, were supportive, although it was acknowledged that certain administrators might worry about technology replacing teachers, or that funds would be channelled in new directions. The average overall rating for approach was 5.6.

Access

The technology was judged potentially useful for a range of learning needs (Rating 7). As may be gauged from the developmental plans noted above, there are proposals to develop Lexiphon materials (a) for the learning of foreign languages in Australia (initially Chinese and Japanese), (b) to enhance the language skills of those from non-English speaking backgrounds, (c) to promote reading, writing and spelling skills of adults in the general community who might require help in these areas, and (d) to meet the needs of the reading disadvantaged in specific trade courses (initially the bricklaying and vehicle trades).

Ideally, the equipment and materials are intended to be used individually or by one or two students at a time. It was noted, however, that the materials could also be used "for small groups working through an attached listening post", with a nominated leader controlling the wand. The facility to create work sheets where the size of barcodes may be modified to meet the needs of individual students shows how Lexiphon materials can be adapted to a range of student abilities.

Management and support

Lexiphon was rated highly (Rating 7) as far as managing and setting up the equipment was concerned. It "takes an absolute minimum of time", we were told, to set up the equipment or to shut it down. The services of a technician are not required. Our observations of students in special classes using Lexiphon show that quite young students can use the equipment readily once it is in place and with a minimum of instruction. There seems little doubt that adults in literacy classes could operate the equipment as easily.

On-going support for Lexiphon is being negotiated through a major, international, electronics company. At this point, it is too early to comment further about service or support though the administrators interviewed expressed confidence for ongoing support (Rating 6).

Costs

The costs for the equipment (Compact Disc Player, Lexiphon interface, Digital Light Pen, and Headphones) is estimated at under $1000 for education bodies (i.e. tax exempt). This seems quite reasonable in comparison with similar kinds of electronic equipment being purchased by educational institutions. The price of software will depend fairly obviously on size of production runs. The major cost here is for producing the master disc (which includes fees for sound recordists, sound editing and disc processing). A cost of approximately $15,000 is considered a realistic figure. It is not possible to specify the individual cost of books and compact disc but for reasonable production runs, an estimate of between $20 and $25 is likely. Costs was given a rating of 6 in comparison with similar equipment and materials.

Other features

One of the main features of the Lexiphon learning system is the flexibility the user has in terms of how much help is required. A reader can get word prompts of various types. At one level the reader is encouraged to use context clues to predict meaning, as a barcode may only be available for a certain word. The use of spelling and writing exercises which may be developed in conjunction with coded compact discs, while very much in the drill and practice mode, incorporate real speech. **Panel 7.1** lists the advantages and disadvantages of Lexiphon, as seen by one TAFE administrator.

Panel 7.1

Advantages and disadvantages of Lexiphon

Advantages

1 Lexiphon avoids the difficulty, currently experienced with audio tape, of pinpointing where speech segments begin and end.

2 Lexiphon provides virtually instant feedback and the student has full control over the pace.

3 Barcodes can be arranged to provide help to suit different needs, for example:
  responses at different speeds
  responses in the native and target languages
  explanations of words and concepts.

4 Hardware costs are reasonable.

5 Language can be presented whole. Words fit into stories or connected text. A book becomes alive with the spoken language to support it.

Disadvantages

1 Each Compact Disc has to be individually prepared. At present this can only be carried out at considerable cost.

2 Reading material needs to be printed with accompanying barcodes. Thus normal texts cannot be used.

3 While Lexiphon could be a useful addition to a learning program, it could not take the place of the teacher. There are other technologies that also offer a speech facility.

Marian Norton
Queensland Department of TAFE

The portability of the Lexiphon reading materials is an advantage over *computer only* text systems in that adult learners can practise reading without the computer. On the other hand, the nature of the barcodes themselves and the use of a light pen takes a little practice and is cumbersome in comparison with pointing, say, using a mouse.

The view was very strongly expressed by a leading authority in speech and hearing that optical disc was the storage medium of the future. The huge storage capacity of CD discs makes them ideal for storing sound, with its enormous memory requirements. With the advent of erasable compact discs, the potential for this system will be even greater.

As noted in Panel 7.1, there are other technologies that incorporate speech (several of these are taken up in Chapters 8, 9, and 10). Lloyd (1989) also reviews certain other developments that have experimented with synthetic and real voice speech, including the innovative work completed in the Department of Engineering Physics at the Australian National University (see, for example, Grocke and Macleod 1986). In the final case study (see Chapter 11), a HyperCard application is described where speech and graphics can be created, modified, and reused by teachers and students.

Concluding comments

The ideas behind Lexiphon are simple but ingenious. What this Australian invention achieves is to couple optical disc and barcode sensing technology to produce a new educational tool. Speech undoubtedly adds a new dimension to text, and what Lexiphon offers, due to the enormous storage capacity of optical disc, is high quality human voice.

It is too early to comment on the educational effectiveness of Lexiphon because the real test is from students. What we have seen to date is a prototype model and a limited set of literacy materials. Most of the problems associated with the equipment have been solved. Access time is impressive. The equipment is relatively inexpensive, easy to use and reliable. What is needed now are supporting, top quality learning materials. Resources are required for this and a team approach adopted involving adult educators, language experts, and graphic artists.

We are aware that Lexiphon is controversial. Not all teachers are going to support what they see as the underlying approach to reading and language. Good teachers, however, can find ways to use most tools to the best advantage of their students. To do this though, they will want to modify the materials to the extent, at least, of making their own exercises. Here lies a hidden cost, for access is needed to a microcomputer and software for generating barcodes.

There are other technologies that provide some of the same advantages as Lexiphon. MacRecorder in conjunction with Hypercard is one, and Lexiphon needs to be evaluated in comparison with these other technologies, as well as in its own right.

The real potential for Lexiphon is likely to be realised in the learning of foreign languages. The use of two channels on compact disc for the home and target languages raises all kinds of exciting possibilities. A talking, language dictionary is just one of these. There would seem to be considerable scope to market innovative language learning materials to satisfy those learning another language.

8 CASE STUDY:

Talking Computers for the Blind

Talking computers are being used at the South Australian Royal Society for the Blind (RSB) to provide *a window to the seeing world* for adult literacy learners. This study set out to record and evaluate this application of computer technology to the provision of literacy skills for blind and visually impaired adults. As in the previous case studies, the criteria for evaluating the potential of technology in adult literacy learning (Chapter 2) provided a framework for the evaluation.

Talking computers in the literature

The use of speech with computers has been available for several years. However, never have speech capabilities been more accessible to computer users than they are now. Computers with speech facilities are at the forefront of a new generation of offerings to learners.

Synthesised speech

The use of synthesised speech is the most common way to create *talking computers*. The *Echo GP* synthesiser, for example, allows the computer user to convert text to speech. This is done by decomposing words into groups of sounds (phonemes and allophones) which can be reconstituted into synthetic speech (Vincent 1986). The effect is immediate feedback on words that have been entered at the keyboard or appear on the screen. Strickland, Feeley and Wepner (1987) describe a number of software programs emerging to make use of this innovative technology. As Chapter 10 of this report indicates, there are now many more programs which make use of synthetic speech.

One of the major drawbacks with early synthetic speech concerned its intelligibility in the text-to-speech mode. Olsen, Foltz and Wise (1986) reported that as few as 40 per cent of words presented in isolation by the *Echo II* text-to-speech synthesiser could be correctly identified. Certainly, newer synthesisers such as the *Echo GP*, *MacinTalk*, and *Optimal Voice* (Wharton 1988) produce a less robotic sound, but there is still room for improvement. The *Optimal Voice* system, described in this case study, provides blind and visually impaired users with quite an acceptable quality of speech. In a British study, speech synthesis was used to teach Spanish to students (Stratil *et al.* 1987). Natural accent in words and intonation were programmed to give further evidence of the potential for this technology.

Ridgeway and McKears (1985) describe a number of text-to-speech and voice recognition devices for the disabled. Recent research into speech recognition systems holds promise of going beyond the *listening typewriter* to the *intelligent assistant* that listens to what the user tells it and then carries out the instructions (Young *et al.* 1989). Strickland, Feeley and Wepner (1987) describe the educational potential of speech synthesis/recognition programs:

> What better way to begin to teach children or adults to read than to add speech to what they can type or have a system capable of recognising their speech and turning it into print for them to read back (Strickland Feeley and Wepner (1987: 182).

Digitised speech

Digitised speech, which requires much greater memory capacity than synthetic speech, is produced by recording a human voice and then digitising the analog signal for storage in the computer (Olson and Wise 1987). When speech is requested by the user, the computer uses the digital information to reconstitute an analog signal for amplification by the computer's sound system.

The major limitation of digitised sound is the enormous computer memory it requires (Witten, 1982). For example, the Apple *MacRecorder* may record sound at various sampling rates up to the highest quality which uses 22 000 bytes of memory for every second of recorded sound. This means that a few seconds of digitised sound would consume the total available memory of most machines in use in adult literacy classes. Fortunately, megabyte microcomputers with large capacity, hard disk drives, have made digitised speech a viable possibility for adult literacy use. One solution to the memory problem is to use the ultra high storage capacity of compact discs. The Lexiphon system (reported in the case study in Chapter 7) is an example of applying the newest of technological innovations to literacy instruction.

How the study was conducted

The initial meeting at the South Australian Royal Society for the Blind (RSB) was negotiated by phone. At this meeting, we outlined the purpose of this study to teacher, Jenny Charlesworth. The response from Charlesworth was very positive and enthusiastic; a *talking computer* was demonstrated and access to students was granted.

Examining the technologies

Information was gathered on the hardware and software used. This involved examining the equipment that produced speech in the Resource Centre (Charlesworth's classroom), and in the Alternate Print Unit, where two of Charlesworth's ex-students now work with a Braille printer and other devices.

Observation

The use of the technologies was observed on three occasions at three separate locations. The first instance was a demonstration by Charlesworth during the initial meeting at the Resource Centre. This was followed by a visit to the home of a visually impaired student who had purchased a *talking computer* to set up a word processing business. Finally, the technologies were observed in use at the Alternate Print Unit.

Photographs were taken to demonstrate the technologies, the way they were used, and the physical features of the learning environment.

Interviews

Several interviews were conducted. Firstly, Charlesworth, currently the Computer Training Officer, was interviewed. The next interview was conducted with Rebecca Noble, involved in the development of the program as a teacher, and now an administrator. Interviews were also conducted with three ex-students currently using the technology for work.

The first part of the interviews followed an open format. A set of key questions were developed and reproduced as a questionnaire to be handed out early in the interview. The intention was that if responses were hard to come by, this sheet would be used as a prompt. However, the interviewees needed no such prompting and the questions were worked through in a random fashion, dictated by the flow of the conversation. Any documented claims or points about *talking computers* were raised in this part of the interview.

The second part of the interview used the evaluation criteria (Chapter Two). Our list of questions was constructed to highlight some of these criteria and to inquire into aspects specific to *talking computers*. Thus, in this part of the interview, we worked through the criteria and discussed anything that had not been covered earlier. At the conclusion of the interview, the administrator and the teacher were asked to respond to each of the key areas on the appropriate seven-point scales.

Permission was granted for the interviews to be audio-taped. The administrator and teacher were interviewed separately, each interview lasting close to an hour.

Two of the adult learners were interviewed together. Their interview was different, looser, and much more of an interchange – a conversational format. At the end of the interview, we made a subjective decision and filled in the sheets for them, based on their responses to the criteria questions. An adult learner was interviewed prior to the criteria being fully developed, and consequently the tabulated values do not represent this participant's views.

Recent history of the Alternate Print Unit

The corporate philosophy of the RSB, an organisation established in 1884, emphasises a quality service based on cooperative care. The needs of the individual are catered for in a manner which focuses on *ability* rather than disability. This is the philosophy behind the use of *talking computers* at the RSB.

In 1986, a Computer Communications Course was developed at the RSB. This was a response to an administrative computer initiative: An Apricot computer, with speech synthesis capabilities was purchased. Teachers, Jenny Charlesworth and Rebecca Noble, were expected to learn how to teach with it. Noble recalls:

> *An administrator saw it and thought it was the way to go ... at the time it was very innovative – none of the associations* for *the blind in the whole of Australia had even looked at computers. We were the first in Australia to get a course up and running with computers ... It was very innovative, but a bit terrifying for me, having it plonked on the desk like that.*

When Apricot computers were unexpectedly withdrawn from the market, the RSB had to reevaluate everything – the whole course and the equipment.

> *It was decided after much debating, to go to IBM. This was most appropriate because we have adults looking for employment ... It fitted in with most employment equipment more readily than Apples – the other of the two main PCs at the time.*

The RSB offers three ways of accessing print from the computer screen. The use of synthetic speech is one way, another is by means of a large print program. This program may be used by those with some residual vision, as it offers the user a range of different letter sizes. For those with extremely poor vision *and* a hearing impairment, a braille computer is available. The Alternate Print Unit at the RSB uses a *talking computer* with a Braille printer to translate texts into Braille documents. Text is entered via the talking word processor, then *Duxbury*, a translation program, converts the text into Braille and the Braille printer creates the document (**Figure 8.1**).

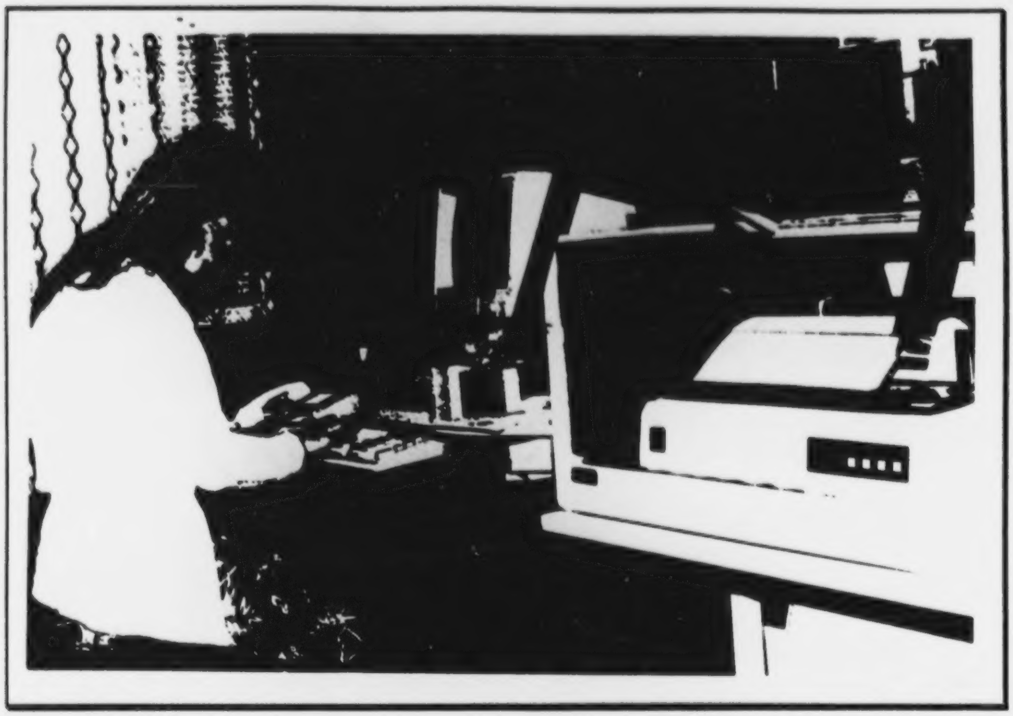


Figure 8.1: *At the Alternate Print Unit, Vicky, Braille Library Officer, works at a Talking Computer. The Braille Printer, to the right, creates documents at the rate of 12 lines per minute.*

The computer communications course

The *talking computers* at the RSB allow users to hear what they have typed, to locate the cursor anywhere on the screen, and to have audio feedback on the usual word processing functions. In order to train people to use the synthetic speech device, prerequisite typing skills are required. The RSB conducts touch typing classes to train people to type on a typewriter, without needing to see the keys. Before beginning the Computer Communications Course, students must reach a typing speed of at least twenty words per minute.

The five-week Computer Communications Course aims to develop adult students' computer literacy, to familiarise them with the equipment at the computer workstation, and to provide in-depth instruction on the use of the *SuperWriter* word processing package. By working through aspects of the word processing program, such as the use of special keys, manipulating text, resetting margins and spell checking, blind or visually impaired people are able to use the computer as *pen, paper and filing cabinet.*

The talking computer

The computers at the RSB require hardware and software to become talking computers. The equipment is supplied by a Victorian company, Australian Optimal Computer Systems. The hardware includes an internal synthesiser board and an external speaker, with headphones optional (**Figure 8.2**). The synthesiser board, Artic Technologies' *SynPhonix* board, is installed into any vacant slot in the computer and has a volume control knob which is accessible at the back of the computer.

The software, *Optimal Voice*, is a memory resident program which provides audio responses to any keystroke. It is claimed to be usable with any software that will run on an MS-DOS computer.

Figure 8.2: *An IBM clone with external speaker and headphones. The Artic speech synthesis card fits into any vacant slot in the computer. The serial port on the computer is set up for voice, leaving the parallel port available for printing.*

The *Optimal Voice* User's Manual outlines the four basic modes by which the voice functions may be operated (**Figure 8.3**):

Normal scanning mode

The normal scanning mode is the default mode. The screen may be reviewed by line, word, character or entire screen. The cursor may be used to scan the current screen using the function keys such as next word, next line until a non-function key is pressed, at which point the cursor is repositioned at its original position.

Input mode

All scanning functions may be used but, in addition, any letters or words will be spoken as they are typed at the keyboard (the input mode). Each word will be spoken after a space, or a return, or after three seconds.

Output Mode

Again, in output mode, all scanning functions are available but any letters or words appearing on the screen will be spoken. Thus information such as computer messages, directory listings, time, date and program prompts will be spoken.

STOP SPEAKING	SPEAK CURSOR
SPEAK WORD	SPEAK CHAR
SPEAK LINE	SPEAK SCREEN
INPUT MODE	OUTPUT MODE
SPEECH RATE 1 TO 9	SPELL MODE ON/OFF

FUNCTION KEYS

HELP ON/OFF	SYSTEM STATUS
SEARCH WORD	
GOTO BLOCK	SPEAK BLOCK
SET START OF BLOCK	SET END OF BLOCK
PORT TALK CONTROL R V P T	AUTO MODE ON/OFF

ALT + FUNCTION

START OF FIRST WORD	END OF LAST WORD
MOVE TO TOP OF PAGE	MOVE TO END OF PAGE

SHIFT + FUNCTION

OPTIMAL VOICE ON/OFF	
MOVE TO PREV WORD	MOVE TO NEXT WORD
MOVE TO PREV LINE	MOVE TO NEXT LINE
MOVE TO PREV CHAR	MOVE TO NEXT CHAR

CTRL + FUNCTION

Figure 8.3 *The layout of the Optimal Voice function keys. There are ten function keys and each may call up to four different functions.*

Spell Mode

All of the above modes may also be used in spell mode. When this mode is used, all words will be spelt out, including all punctuation.

Optimal Voice is controlled through the use of function keys laid out in logical groups to make the facility easier to use. The voice, in effect, acts as a second cursor which can be sent to any location, by a keystroke, to speak out whatever the user wants to retrieve.

Students can therefore use the synthetic speech device on any program that will run on the computer. This is a great advantage as it allows blind and visually impaired students to access a broader range of materials than was previously available to them. The RSB course teaches students to use the *SuperWriter* word processing program. However, students are also able to learn specific software of their choice on request.

From the students' point of view

The opinions of three adult students were sought on *Talking computers*. One student, Malcolm, was observed using a *talking computer* at his home. Although this interview was not structured around the criteria developed for these case studies, Malcolm's comments were very much in line with the responses of the other two students, Cindy and Vicky, who were interviewed using the criteria framework. **Table 8.1** represents the mean student ratings for each criterion, on a seven-point scale, where the higher the rating, the more favourable the response.

Clearly, students responded very favourably to *Talking computers*. In terms of a blind or visually impaired person's expectations, the computers provided *more* than could be expected. With very minimal vision, certainly not enough to read books, Malcolm is trying to set up his own word processing business from home. He bought a *talking computer*, after doing the course at the RSB.

Table 8.1: *Student ratings of talking computers on six criteria*

Criteria	Rating
Expectations	7
Needs	6.5
Feedback	7
Interest level	5
Learning	6
Ease of use	6

Malcolm's comments reflected the empowering effects of *being able to find one's way through text*. He spoke proudly of his achievements of producing teaching hand outs and overhead transparencies for sighted students in study courses he has run. Incredibly, Malcolm is paid by sighted tertiary students to type and format their college essays! The results are superbly designed, spelling-error free manuscripts. Without the *Talking Computer*, this would not be possible. All three students concurred.

Talking computers certainly assist students in achieving their learning objectives. All agreed that their writing styles and ability to communicate accurately and effectively had improved through regular writing. Further, the most significant factor in meeting users' needs, was the immediate feedback that the speech system offered. In fact, the students had been using the system for long enough to see it as simply a tool. It was something they used at work and there was no longer any amazement, just appreciation of what they were able to do now, that before *talking computers* they could not. Perhaps this is why the *interest* rating was lower than the other ratings.

Cindy, partially sighted, works in the Alternate Print Unit, where letters, documents and books may be transferred from ordinary print into Braille documents. **Figure 8.4** shows Cindy using a closed circuit TV together with a *Talking Computer*. Here is what she thought about word processing with the *Talking Computer*:

> *I learned touch typing at Townsend ... I didn't enjoy typing as much as using the word processor. Erasing is one of the really good things – when we didn't have it you'd have to re-type the letter ... You'd have to rely on others to find any mistakes ... Being hooked up to voices – that's a terrific benefit. Its an independence; you can type something, check it, print it, without needing anyone else.*

Being able to produce accurate work was seen as a tremendous plus by the students. Using a spelling checker in a word processing program, for example, is not possible for these users without the use of speech enhancement. The point was made that the spelling checker *uses American words, so you have to be careful*. One of the elements of the speech system that could be improved, according to Vicky, the Braille Library Officer, is the speech quality.

> *A while back we tried Vert Plus and I didn't want to give it back. It was an improvement. The voice was more interesting; there was intonation, it said the words properly, and when it got to a capital it would beep – this one won't.*

Vicky is blind. She types at sixty-five words per minute, using a four track tape recorder with speed control to hear one sentence and then type. *I'm hoping for a dictaphone ... foot control and easy rewind.* While observing Vicky using the *Talking Computer*, it was evident that she only used the functions that she required. She was extremely confident and sure of the technology because it was easy to use. A problem, however, was noted in terms of flexibility of use. Although the User's Manual suggests that *Optimal Voice* will work on any MS-DOS software, Vicky says there have been some problems.

> *The hardest thing is getting the voice to work properly with everything .... one program we tried, the error keys weren't talking to me.*

From the teacher's point of view

Jenny Charlesworth, originally a craft teacher at the RSB, began working with *talking computers* in response to a need for more staff input early in the development of the Computer Communications Course. Training was on the job for Charlesworth, who is now the RSB's Computer Training Officer. *Talking computers* have brought about great changes for students and have also changed the teacher's role. Charlesworth's ratings of the *Talking computers*, on the evaluation criteria seven-point scales, were very positive (**Table 8.2**).

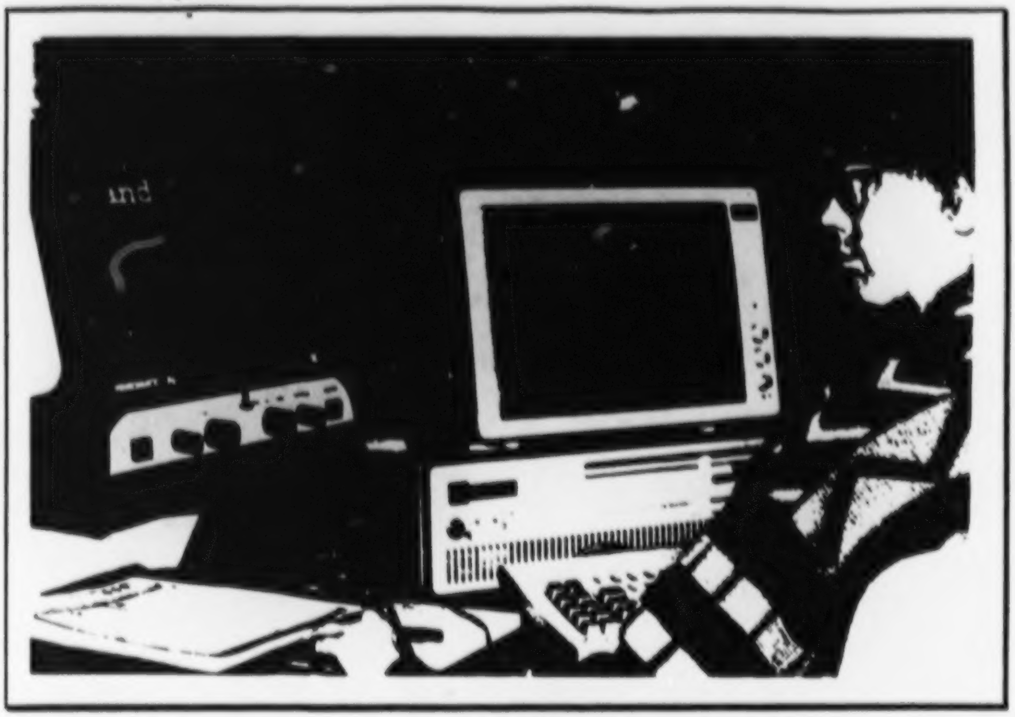


Figure 8.4: *Cindy using the close circuit TV to help enter text into the computer. Depending on the text, Cindy, will alternate between the close circuit TV and the speech synthesis facilities.*

Portability stands out as the least favourable feature of the *Talking computers*. However, Charlesworth indicated two significant ways in which this problem is being addressed. The machines are not portable but improved *access* to *talking computers* will alleviate the problem. The rights to the *Optimal Voice* software have been bought by the RSB – students may have the software, at no cost, if they wish to install it on their machines at home. They simply need to buy the synthesiser card for about $600. This is a relatively small outlay, compared to $1500 for the *Business Vision* equipment that is used in Victoria and New South Wales.

Role changes

The other improvement in access to *talking computers* is linked with the changing role that computers have brought about for Charlesworth.

> *Under Government legislation we have to push for community integration as much as possible and provide the backup and support for blind and visually impaired students. My role has changed ... I am now more involved in getting to TAFE lecturers and others and showing them how to go about teaching the blind and visually impaired ... I couldn't do it without the technology.*

Indeed, synthetic speech units are filtering into TAFE colleges and other organisations. WEA, for example, has two units set up for student use. A TAFE Disability Officer wants to buy a bulk order of Artic cards, to get them more cheaply, with the aim of having one *talking computer* in each TAFE College. Further, employers may buy a card for their visually impaired employees since the cards have been developed to run on machines most likely to be in offices and businesses.

Table 8.2: *Teacher ratings of talking computers on 12 criteria*

Criteria	Rating
Objectives	7
Outcomes	7
Approach	5
Interest level	6
Appropriateness	7
Flexibility	6
Adaptability	6
Learning	7
Familiarity	7
Portability	4
Convenience	6
Ease of use	5

Flexibility

Increased flexibility was seen as a key factor in using *Talking computers*. Although flexibility did not rate as highly as this statement may suggest, this is explained below. Flexibility impinges greatly on the other criteria. Charlesworth felt strongly that the technology was most appropriate for allowing students to achieve their learning objectives, to alleviate their print handicaps. She felt that this was the best way of achieving educational outcomes for students. However, the way this comes about is important. *Talking computers* allow blind and visually impaired students to be instructed as a group, and to be expected to achieve.

> *Group teaching was a first. When you work with visually impaired people you have to do lots of explaining ... Now we're at the screen as a group, students can work together and get feedback from their peers ....*

Charlesworth felt that, although the *Optimal Voice* program was very good, improvements could be made. At the moment, the software will only read text based programs, any borders or graphics cannot be read. The program will only read from left to right, not down columns. By looking at the needs of students, Charlesworth has suggested improvements to the program which will, for example, allow spreadsheets to be read. Further flexibility can be developed by incorporating *user selection* of voice function keys.

> *I've asked Chris Wharton, the programmer, to modify the program so that users can decide what keys they want as voice function keys ... For*

> *example, they may want a numeric key pad because they need the function keys for a program they're running.*

Finally, Charlesworth felt that the *talking computers* were easy to operate because the functions were broken down into a simple logical format. Consequently, student interest levels were always high.

From the administrator's point of view

Rebecca Noble, Data Processing Coordinator, established the first *talking computer* at the RSB and, together with Charlesworth, experienced the vast attitudinal changes that the Computer Communication Course brought about at the RSB. Noble's ratings on the generalised criteria (**Table 8.3**) were very positive towards *Talking computers*. The ratings were on a seven-point scale, where the higher the rating the more favourable the response.

Table 8.3: *Administrator ratings of talking computers on seven criteria*

Criteria	Rating
Objectives	7
Outcomes	6
Approach	6
Access	6
Management	7
Service/support	5
Costs	4

Objectives

Noble felt that clear educational objectives were achievable using *Talking computers*. When students write down what they want to achieve, it can often be crystallised into wanting to become independent. The central objective of *talking computers* is to provide this independence, and Noble felt they did this very well. Clarifying the objectives, from an administrator's point of view, meant making some decisions about equipment. For example, the sound quality could be improved, although the cards presently used are the best in that price range. At $4500, *DEC Talk* allows a large range of voices and better quality:

> *Originally we thought, wouldn't it be nice if everyone could have DEC Talk, but really the main job of the synthetic speech card is to be able to read back what's on the screen in a near enough voice, which is what the Artic card does very well at around $500 ... You can't complain!*

Outcomes

Very positive outcomes were evident in the successful learning that the RSB monitors through pre- and post-testing. Further, there has been a huge difference in the employment prospects of students. For example, a blind chiropractor is using the technology to keep client records; a blind accountant stores case histories and invoices clients; a blind journalist contributes to a viticultural journal; a retired policeman, after recently losing his sight, has gained a new lease of life as an author. As Noble puts it:

> *There's no limit to what people can use it for. It's their pen, their paper, and their filing cabinet. How they use it outside of that is up to them ... The technology has had an amazing impact on people's lives.*

Attitudinal changes

Of significance has been the vast attitudinal changes that have occurred within the RSB and in the institutions that now deal with blind and visually impaired students. There has been a significant change in the attitude of the RSB towards students. The history of agencies like the RSB has been characterised by a protective ethos:

> *All these agencies were set up years ago so people could come in everyday and we'd hold their hands; they were never allowed to fail because they'd keep coming and coming 'til they got it right – when they did, what a shock, because the real world doesn't hold your hand ... You have to be prepared to accept failure and criticism, which a lot of people couldn't handle.*

The Computer Communications Course made students compete, perform, work in groups, interact in a way that brings them closer to real community life. It is only through the use of *talking computers* that this has come about. According to Noble, there were many people within the RSB who were, at first, not impressed with this change. Through technology, administrative inroads have been made. The RSB today, says Noble, is less like a rehabilitation centre where efforts are made to be everything to everyone. A new role has emerged: to provide access to the computer via speech. These administrative inroads are evident in other institutions where the technology and the technical support from Charlesworth is opening doors for RSB students.

Conclusion

The reactions of students, teacher and administrator to *Talking computers*, were most favourable. It is clear that the role of synthetic speech in providing access to learning at the RSB is a significant one. However, it is not just the speech capabilities that make this technology successful. The simple, unobtrusive approach of the software makes it easy to learn, and because it is accessible as an enhancement of any software, it becomes incredibly flexible.

An important aspect of using the technology effectively is being able to improve it, as the need arises. Being able to commission a customised program is indeed a very positive aspect in the use of this technology. The comments made by all regarding the speech quality reflect the compromised nature of the technology. Certainly, clearer speech with intonation would be an improvement, but this must be balanced by the need to provide cost effective technologies. The point was made that while the sound could be improved, the fact that the user has just written what is most likely to be spoken, means that accurate predictions of spoken words can be made.

Talking computers allow blind and visually impaired users to participate more fully in our society by giving them access to the printed word. In the sense that being literate involves thinking, understanding, and communicating in meaningful ways, this technology provides users with the means to join society, to be confident about what they can do, and to build on skills that they already have. Inherent in the notion of being literate, is one's ability to operate effectively and independently: *Talking computers* help and motivate users to do this. The empowering effect of this technology is evident in the successful endeavours of many of the students who have used them. There is no doubt that for the users at the RSB, this technology has turned *impossibilities* into *realities*.

In the future, *talking computers* may well be extended to wider educational use. The advantage of having a facility that operates with any software offers great possibilities for all users but, in particular, for the adult literacy learner. The important link between employment and learning has been made at the RSB. This is a link that motivates many adults, and gives them a tangible reason for learning.

9 CASE STUDY:

Interactive Videodisc – A Tool for ESL Learners

An interactive videodisc called *The Aussie Barbie* is being used within the Adult Migrant Education Program at the Adelaide College of TAFE in South Australia. This case study set out to record and evaluate this application of videodisc technology in the teaching of literacy to adults learning English as a second language, and subsequently to estimate the potential of the medium for teaching and learning in adult literacy programs. In making these judgements considerable use was made of the general criteria described in Chapter 2.

What is *The Aussie Barbie*?

The Aussie Barbie is a learning resource which makes film sequences and associated slides of realistic language use readily accessible to teacher and learner who are able to exploit these resources for language development through highly user-friendly technology. *The Aussie Barbie* videodisc contains thirty-five minutes of video motion pictures, made up of hundreds of short and long sequences, and two thousand stills and slides of social interaction set around a typical Australian backyard barbecue. It was originally designed for beginning learners of English as a second language with an Australian Second Language Proficiency Rating of 0+ to 1+.

Quick and accurate access, a maximum of one and a half seconds, to any sequence or still, is available through a remote control or touch screen. As a result, the disc can be used in a presentation mode for teaching (Level 1 use), or in a self-access mode by students working in groups or individually (Level 3). Learners can observe and, by using the touch screen control, take part in one-to-one and group interaction involving a standard range of everyday topics ranging from the weather to family, and a host of language techniques and functions such as inviting, explaining, apologising, and answering the telephone. See **Figure 9.1** where a student is accessing one of the still frames on weather.

The fifteen main characters can be questioned on a number of points including their marital status and occupations. The learner may even ask to hear some gossip about each character and to see their family albums. A point-of-view camera technique enables learners to feel they are actually at the barbecue, and this is reinforced when protagonists turn to the camera, address the learners, and invite them to contribute to the conversation.

Other features such as review facilities, access to further examples of a particular language use, questions and exercises at the end of modules incorporating two levels of language proficiency, are discussed below where the package and its documentation are analysed.

How the study was conducted

Following procedures recommended by Stenhouse (1988) and Patton (1987), a wide range of data sources was pursued. These included:

a) a review of earlier literature about *The Aussie Barbie*,

b) an analysis of the package and its accompanying documentation,

Figure 9.1: *A student accesses a still frame on weather quickly and easily by using the touch screen*

c) direct observation in a participant-observer role of
  - a staff in-service seminar delivered by a teacher who had considerable experience in using the package
  - a teacher-led lesson where students were meeting the software for the first time
  - a group of students meeting the software for the first time without a teacher in attendance
  - a lesson where the software was used in the presentation mode by the teacher
  - use by students working in groups
  - use by students working individually,

d) interviews with
  - the creative designer of *The Aussie Barbie*
  - the administrator of the centre where the package is used
  - a teacher experienced in using the package
  - students in a group situation
  - students individually, and

e) the administrator, teacher, and students interviewed were asked to respond to the generalised set of criteria on the appropriate seven-point scales.

Most interviews and direct observations were audio-taped. In these instances, the permission of participants was sought and obtained. As far as possible the ethical considerations raised by Walker (1986) were addressed, especially his comments on the necessity to develop negotiated meanings. For example, the draft narratives of observed lessons were referred to the teacher concerned for comment and clarification.

What has been written about *The Aussie Barbie?*

While most commentary on *The Aussie Barbie* has been favourable, there has been very little in the way of formal evaluation. Schick, Russell, and Peppard (1987), the production team for the package, point to positive design features emphasising the human interface. They argue the advantages of the touch screen control over mouse and joystick for the targeted audience – beginning learners of English as a second language.

Peppard (1989), in addition to describing what he sees as its strengths, raises problems encountered in producing videodisc film which involve maintaining the integrity of the educational objectives. When the production process moves from educators and subject experts to the hands of media people, concepts may be altered with little consultation to enhance the media presentation. Peppard notes:

> We found it essential that the subject matter expert actually be on hand in the planning and shooting of the video and still material and be given the final say on details of production. ... One of the challenges we experienced was working on a production based on random access, non-linear motion sequences with a crew that had only produced linear videos with clear beginnings, middles and resolutions. We asked them to make a gigantic lego construction with hundreds of pieces that had to be able to be linked to any other piece. This required a new kind of acting skill (Peppard 1989: 632-633).

Peppard also mentions the resistance to the take-up of new technology and bemoans the fact that, while students curiously had few reservations and "have taken to the touch screen and self-access program with gusto", teachers are somewhat circumspect (Peppard 1989: 633). During the interview with Herb Peppard, he intimated that with respect to videodiscs he felt, here in Australia, we were half way through the five-year period it takes for teachers in general to accept a new technology fully.

In a commentary on electronic educational resources for teachers, Berman (1987) includes *The Aussie Barbie* in a list of noteworthy laser disc resources. She speaks glowingly of it in the following terms:

> It has to be seen to be believed. The user is invited to a barbecue and accepts or rejects the offer. On arrival at the barbecue, the user is able to talk with a variety of people and even carry rumour from one group to another. It certainly again raises the potential of classroom interaction. Not only can students relate to the context and discussion but they actually participate in decision-making (Berman 1987; 231-232).

Wills (1987) also holds *The Aussie Barbie* in high esteem:

> Instead of using the *tutorial* style of CAL typical in language teaching, this project adopts a combined simulation/database approach.
>
> The scripting, the style, and the production have all benefited immensely from the minds of film people in co-operation with the computer people, to produce a humorous, entertaining, witty, and informative tool they sometimes call a *peoplebase* rather than a database.
>
> ... I believe this project to be one of Australia's best examples and in some way it rivals *Domesday* and *Ecodisc* in the techniques it adopts for its user interface (Wills 1987: 293-294)

Wilson (1987) sees *The Aussie Barbie* as a good example of how an interactive videodisc enables material for teaching/learning to be precisely and rapidly located through random access to a large resource afforded by the laser technology. Moreover, he identifies its strengths as: long life of the resource because the laser does not wear the disc as magnetic heads do audio and video tapes, nor is damage caused when holding a still or replaying a sequence for teaching/learning purposes; easy teacher manipulation by using the remote control (called Level 1 control in interactive video disc technology) or the computer interface (Level 3); the facility to overlay text and graphics afforded by the computer interface, noting that any teacher with some programming skills could easily add to the computer programs supplied with the package; and the extremely easy learner control of the selection of language-in-use situation and the language-learning activities which relate to it.

The Focus Section of *Unicorn* (Vol. 14, No. 1) was devoted to observations on *The Aussie Barbecue*. First, Michalek (1988: 52) notes how *The Aussie Barbie* takes good advantage of the capabilities of interactive videodisc to display high quality moving colour pictures, to play two channels of audio, to show still colour slides, and to overlay text and graphics on still and moving images. The high degree of interaction between the learner and the barbecue guests in real life settings is commended.

Second, Cheetham (1988: 53) emphasises that the interactive videodisc, as well as offering random access to images and the ability to hold them still without damage to the disc or equipment, has the advantage of allowing easy user-control of access to desired images. She also stresses the educational advantages of the touch screen, the *point-of-view* camera technique, and the possibilities of the computer interface which combine to enable the learner to participate in the conversation on the wide range of subjects being discussed by the guests. When a guest addresses a question to the camera, possible answers appear on the screen; by touching a chosen reply, the learner can hear that response spoken, and see and hear the reaction of the guest. Cheetham concludes:

> *The Aussie Barbie* is a teaching medium that is exciting, stimulating, and motivating as well as a lot of fun to use. It has been produced with insight and sensitivity as to the needs of adult E.S.L. learners, and has a good dose of Aussie humour that surfaces throughout.(Cheetham 1988: 54)

Next, O'Neil (1988: 54-5) attempts an assessment of how good *The Aussie Barbie* is. His personal observation is that it offers speed of access to a wide range of topics, language functions, and appropriate learning activities by use of the computer interface; that learning takes place in a natural social and language context; and that the program offers individualised learning with immediate feedback available. He warns of its relatively high cost and, ignoring the presentation mode of use through the remote control and its possible use by groups, links this with his judgement that it is "basically a single-user system" to suggest it is not cost effective for schools.

Finally, in this Focus Section of *Unicorn* (Vol. 14, No. 1), Koeppen summarises:

> *The Aussie Barbie* is a unique approach to teaching English as a second language, along with a number of the social norms that exist in Australian society. It is entertaining, witty and easy to use (Koeppen 1988: 55).

The only formal evaluation in the literature is that conducted by Anderson and Field (1988). The evaluation was focused on the usefulness, effectiveness, and viability of *The Aussie Barbie* for use by adults learning English as a second language, and on teachers' and learners' reactions to the videodisc program prior to making it more widely available. Conducted soon after the release of the disc, much of the evaluation's thrust was formative; for example, the study led to some modifications in the accompanying documentation (especially the *Teachers Guide* which was only in draft form at that time), and served to explore and evaluate the learning activities exploiting the videodisc material through the computer-videodisc interface. Exercises, coded blue for easier and orange for harder, are offered to a user at choice points in the motion sequences. Some of these present two-level exercises afforded by the computer interface became available only during the classroom trials which were conducted in three States over the fourth teaching term of 1987.

Some summative generalisations were attempted. Basically, teachers were found to be very positive to the videodisc, as were students. The attitudes, as reported by Anderson and Field (1988: 14-16), on scales where the higher the rating the most favourable response, are shown in **Panel 9.1**. Many qualitative observations were also made in this study, some of which are referred to below when the data collected in the present case study are examined.

Panel 9.1

Teachers' and students attitudes to *The Aussie Barbie*

Teachers' general reactions (7-point scales)	
Lively-Dull	6.0
Friendly/Unfriendly	5.5
Motivating/Boring	5.7
Active/Passive	5.0
Fast/Slow	5.4
Positive/Negative	5.8
Teachers' reactions as a language learning device (7-point scales)	
Effective/Ineffective	5.4
Innovative/Commonplace	6.5
Appropriate/Inappropriate	5.2
Comprehensible/Incomprehensible	4.8
Students' reactions (5-point scales)	
Positive/Negative	4.7
Interesting/Boring	4.7
Funny/Not funny	2.8
Easy to understand/Hard to understand	4.0
Helped in learning/Did not help	4.3
Can use easily/Difficult to use	4.4
Size of icons O.K./Icons too small	4.4
Physical comfort OK/Comfort not OK	4.3
Confident/Not confident	4.1

Anderson and Field (1988, 14-16)

The hardware needed

To be exploited fully, the package requires a work station comprising

- a videodisc player using the PAL system,
- built-in computer interface and remote control,
- computer (e.g. an IBM/AT clone),
- multi-level content overlay board (Videologic), and
- colour monitor with touch screen.

Without suitable furniture, perhaps mobile depending on a user's requirements, complete work stations cost approximately $10,000 and are marketed by Syslink, 420 High St., Kew, Melbourne, Vic.3103. If the computer used has a hard disk, the floppy disks supplied can conveniently be transferred to it thus avoiding the need to reload disk drives during use.

What is in the package?

The package consists of *The Aussie Barbie* videodisc, *Teachers' Guide*, *Learners' Guides*, transcripts of conversations on the disc, student record sheets, and a set of floppy disks for Level 3 use (see **Figure 9.2**). The videodisc costs approximately $900, the total package with the videodisc included approximately $1650; it is available from The Marketing Manager, National Centre for English Language Teaching and Research, Macquarie University, Sydney 2109. An advertising brochure issued by the Adelaide College of TAFE, which was involved in the production of the package, invites prospective clients interested in further information to contact the college at 20 Light Square, Adelaide 5000.

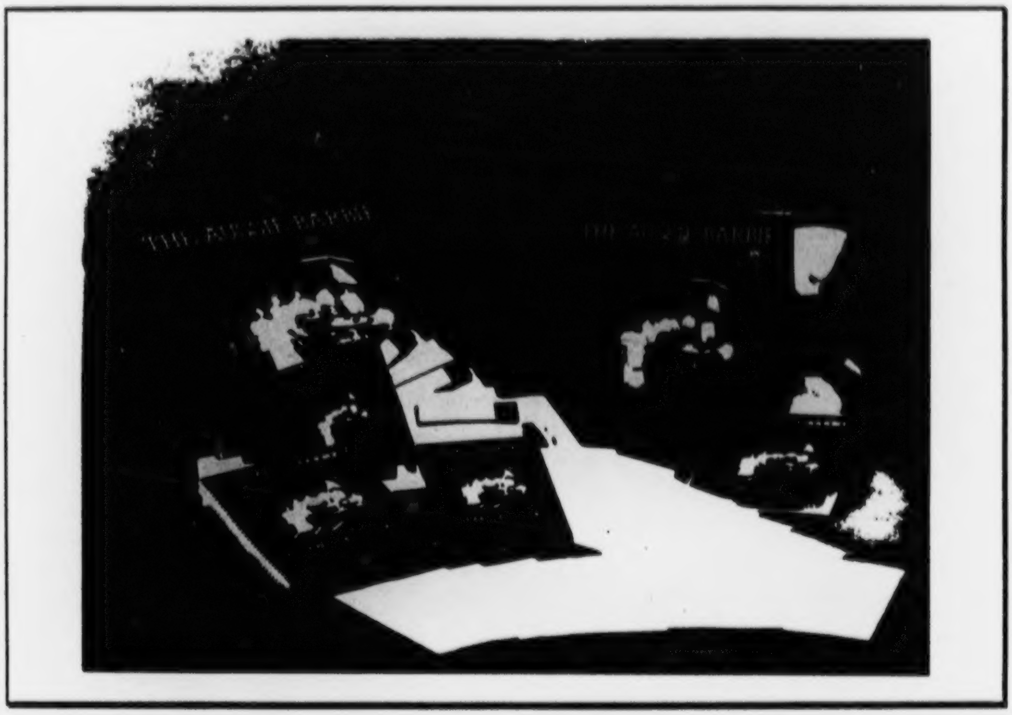


Figure 9.2: *Contents of the videodisc package: videodisc, teacher's guide, transcripts, learner's guide, student record card, and floppy disks for use in level 3*

The videodisc

The many motion sequences and stills on the videodisc represent the quintessential Australian social gathering, providing a realistic portrayal of language used in context. Peppard (1989) points out that the barbecue is a metaphor for Australian society and our modes and topics of interaction. He goes on to explain the organisation of this material:

> The major motion sequences have been designed on a modular model and this gives the user (both the learner and the presenter) defined limits to work within. It also allows easier movement around the program based on conceptual chapters...In designing the disc we thought in the framework of macro-functions/notions (for example, Talking about Occupations or Talking about the Weather) and micro-functions/notions (for instance, Offering and Accepting, or Excusing oneself). The chapters on the disc have become the macros and within the chapters are the micros which can be cross-referenced and pursued in the *Teachers' Guide* (Peppard 1989: 630-31).

The laser technology affords a user speedy random access to any part of the disc.

Transcripts

The conversations portrayed in the motion sequences are documented. Accordingly, a teacher can easily introduce the conversations as written text in their strategies, perhaps in consolidation, reflection or extension activities.

Teachers' Guide

This document contains an introduction indicating the nature of interactive videodisc technology, the overall aims and objectives of the package, the target audience, its educational approach and philosophy, and a rationale for choosing the barbecue setting. A section, called *Who's On The Disc*, gives character resumés of the people on the disc.

The next section, *What's On The Disc*, records the twenty-four chapters into which the motion sequences are organised and supplies an index of the language functions/notions portrayed. Each chapter's contents are thoroughly detailed using the following headings: Main topic, Abstract, Choice points for student involvement, Location on the disc (necessary for finding with the remote control), Characters, Length, and Level of difficulty (ASLPR level). A list of the main language functions in the sequence, vocabulary and idioms featured, paralinguistics worth attention, related material in other chapters, and notes on cultural implications are also included. A second part of this section itemises the slides and stills, recording their position on the disc and organising them into thirteen topic chapters; a set of five further categories, ranging from animals to religion, is supplied.

A final section deals with the method of operating the disc: starting, closing down, problems and simple remedies, and how to use the remote control unit's search and repeat functions.

Learners' Guide

The *Learner's Guide* comes in fifteen different languages (see **Figure 9.3** for some of the languages). It supplies students with a copy of the main map which is illustrated here (see **Figure 9.4**). This map, appearing on the screen during Level 3

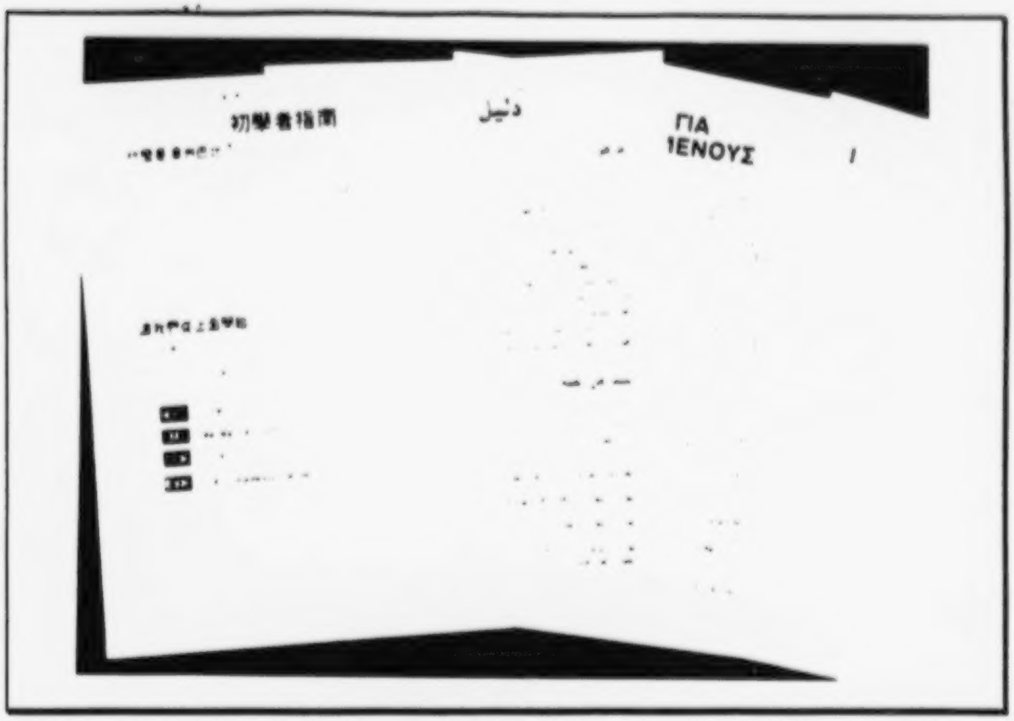


Figure 9.3: *Some of the learners' guides which have been produced in 15 different languages*

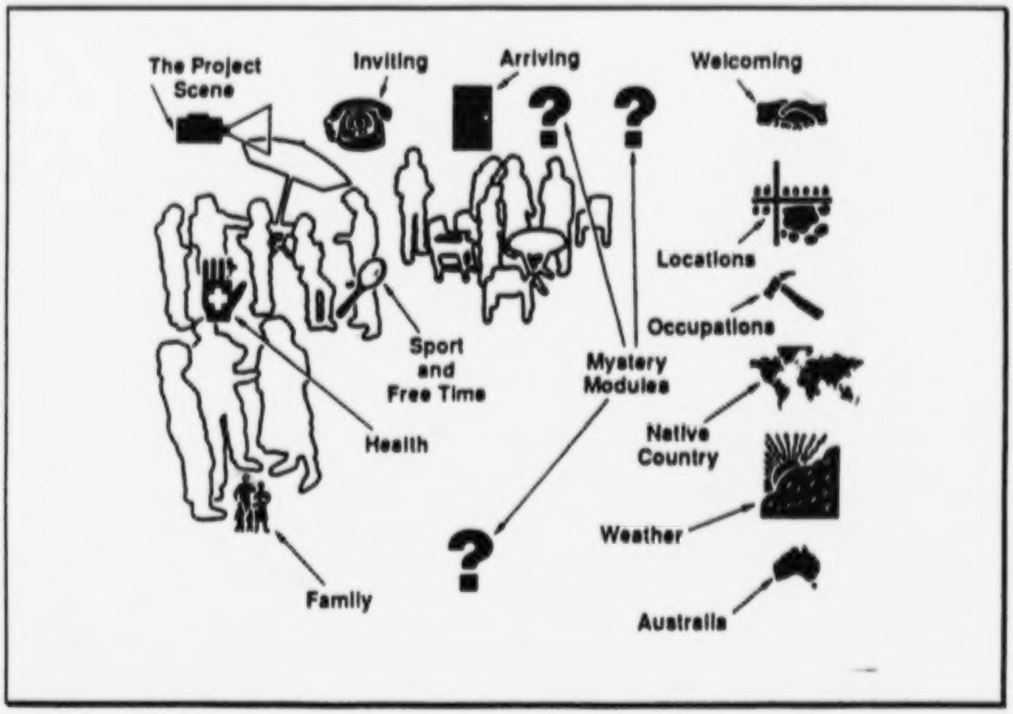

The Project Scene
Inviting
Arriving
Welcoming
Locations
Occupations
Sport and Free Time
Mystery Modules
Native Country
Health
Weather
Family
Australia

Figure 9.4: *The icons represented on the main map of "The Aussie Barbie"*

use, offers a set of conversation topics represented by icons. Students are informed that by touching an icon or a group of people they will go to a sub-map which shows the group and the topics they are discussing; they can watch, listen and talk to this group on any topic offered by touching the appropriate topic icon on the sub-map; a blue icon represents a reasonably easy language level, orange more difficult. They are also told they can ask a series of questions of, or hear some gossip about, anyone in the group by touching their head.

The comprehension exercises, coded in the blue and orange levels of difficulty, are explained and the control symbols which appear at the bottom of the screen defined. These control icons offer the student the following options:

- go back and replay a chapter,
- go to the main map,
- go on to the next comprehension exercise,
- go to some examples related to what has just been seen, and
- review the current comprehension exercise.

Peppard (1989) notes that the basic learning approach for both levels of disc use is analytic:

> The learner is exposed to a relatively lengthy portion of dialogue (varying from 40 seconds to 2 minutes) and then goes through exercises where s/he tries to understand the whole by taking it apart bit by bit.... The learner experiences the context and comes to an understanding of it through control and help. The learner then goes on to further Examples and Practice Exercises to cement and synthesize the language acquisition process (Peppard 1989: 632).

Student Record Sheets

Students may be issued a personal record-keeping sheet on which the main map is reproduced opposite a grid where they can tick the chapter and chapter sub-sections they have completed. This feature did not exist at the time of the trials reported by Anderson and Field (1988) and has gone some way to avoid the occasional aimless repetition of activities reported in that study.

Computer disks

The disks supplied enable the videodisc images to be exploited for educational purposes and technically facilitate the interactive features of *The Aussie Barbie*. This Level 3 control sets up the touch screen/map interaction, the student choice of procedure through icons, and the blue and orange level exercises.

One computer disk permits the learner to exploit the videodisc images in terms of a notional/functional approach rather than through the conversational topics of the main map. Another organises exercises around a set of the videodisc's slides: a number of slides showing aspects of a typical suburb discussed in the motion sequences are accessed, and merged with text and reading exercises from the computer disk.

This control feature afforded by the computer interface means that other computer programs may be authored to take advantage of the rich set of moving and still images on the videodisc. The present computer disks, unfortunately, do not have their own documentation, nor is their educational content treated in the *Teachers' Guide*. This minor omission would appear to be the only weakness in the package's documentation.

From the student point of view

Adult students beginning to learn English as a second language were observed using *The Aussie Barbie* in class, group, and individualised settings, and interviewed on their reactions to it. (See **Figure 9.5** for the group pictured with the videodisc workstation.) During the interviews, their responses to the generalised criteria were canvassed. Because of their low level of ability in English, the criteria were explained to each one orally. The mean student ratings for each criterion on a seven-point scale (where the higher the rating, the more favourable the response), are shown in **Table 9.1**.

Table 9.1: *Ratings of The Aussie Barbie on six criteria from a student perspective*

Criteria	Rating
Expectations	5.7
Needs	5.3
Feedback	6.1
Interest level	6.8
Learning	6.0
Ease of use	6.6

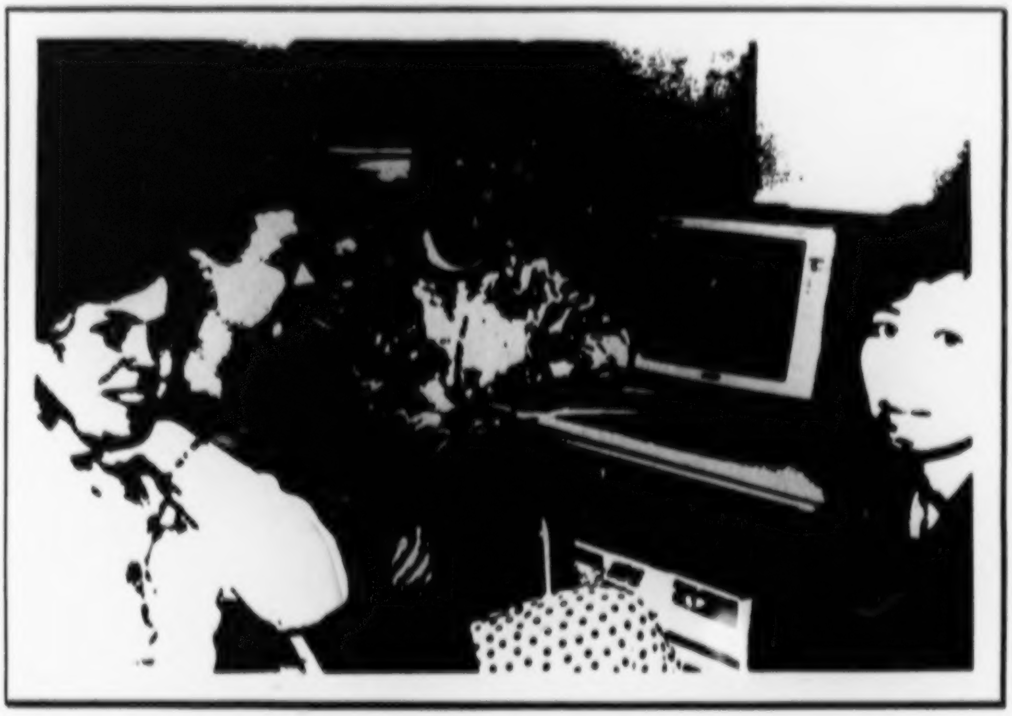


Figure 9.5: *Students using the videodisc; showing the workstation comprising the computer, videodisc player and touch screen monitor*

Expectations and *needs* proved difficult concepts to explore with students whose English was not well developed, especially when the interviewer had no facility with the student's first language. The mean ratings on these two criteria were the lowest, but significantly, they are still high. The teacher interviewed suggested that the package was well suited to their needs: she emphasised the strong oral base needed for reading and writing, and the cultural context supplied for the language use which included not only idioms and topics of everyday conversation but the non-verbal aspects of communication as well.

Students rated *interest level* and *ease of use* highest, remarkably high ratings of 6.8 and 6.6 respectively. The validity of these ratings was supported by the direct observation of student use of *The Aussie Barbie*. Interest level was always high; students worked with some excitement and were eager to do the screen-touching. Often, when there was group use, animated discussion would occur before a decision was taken on where to go next or what was the answer to an exercise question. One of the students intimated that she "would like to take it home with her".

Observation of individualised and group work indicated students had no trouble at all in using the package; within a matter of minutes of using the touch screen, they displayed a fine facility with the control features. Occasional references needed to be made to the *Learners' Guides* written in their native languages; but only one student appeared to have a little difficulty, earning her group's disapproval when she would mistakenly choose the *review* rather than the *proceed* option on her turn to touch the screen. Worthy of note, was the activity observed in a group meeting the package for the first time without a teacher in attendance. They familiarised themselves with the control options and covered a wide range of learning activity in a twenty-minute session.

What was noticed was that students often became so engrossed they failed to keep a record of what chapters and associated exercises they had covered on the student record sheet supplied. As a result, some unintentional repetition of activity was observed during group and individualised use. Nevertheless, students rated *learning* and *feedback* very highly at 6.0 and 6.1 respectively.

A number of students said that the natural speed of conversation in the moving sequences was too fast for them, but that they did not mind this because they could use the *review* option as long as desired until the language function or notion had been mastered. Anderson and Field (1988: 12) had reported some criticism of the speed of the dialogue, but it must be remembered that the intention was that students should be hearing and modelling natural language in circumstances under their control.

Many students revealed how much they enjoyed learning more about the characters through being able to ask them questions, hear gossip about them, and see their family albums. Most thought the way the exercises worked, including the immediate feedback on their responses, helped them immensely.

From the teacher's point of view

A teacher of some two year's experience with the package was interviewed, and observed introducing the package to a class of beginning learners of English as a second language, teaching in the presentation mode with it, organising group and individualised use with that class, and demonstrating its use to other teachers in an in-service seminar. Her ratings of *The Aussie Barbie* on the generalised criteria, using a seven-point scale where seven represented the most favourable rating, are given in **Table 9.2**.

Table 9.2: *Ratings of The Aussie Barbie on 12 criteria from a teacher's perspective*

Criteria	Rating
Objectives	7
Outcomes	6
Approach	7
Interest level	5
Appropriateness	5
Flexibility	5
Adaptability	3
Learning	7
Familiarity	4
Portability	2
Convenience	4
Ease of use	5

This teacher saw the lack of portability as its greatest weakness. Certainly the work station comprises a number of sizeable pieces of equipment but can be loaded onto relatively compact mobile furniture, and indeed was observed being wheeled between classrooms. It was pointed out, nevertheless, that any rough movement, including for example transportation to another institution, can lead to operating problems. The teacher felt that it was better not moved but retained at a fixed station to which students moved: "better the technology stay reasonably put to extend its life-span".

Of the other criteria, only *adaptability* at 3 was rated on the less favourable side of the seven-point scale. This was mainly a reference to the content of the materials which, of course, has been pressed on the videodisc and cannot be changed. It was indicated that teachers, albeit with the necessary skills, could develop computer programs which would complement those commercially supplied, but which would exploit the videodisc resource in ways suited to their teaching requirements. A teacher with the computer programming expertise could adapt the technology in this way, but it was felt that would be a lot to expect of a classroom teacher and that such developments should be left to experts funded for the purpose: "While the content can easily be used for other purposes, the disc cannot be altered".

Familiarity and *convenience* were rated a neutral 4. A complex work station is required and, as well as ensuring the hardware components are properly connected, a teacher has to load and boot the software. It would not be reasonable to expect students, especially those whose English is not yet well developed, to prepare this technology for use. It would be reasonable for teachers to set it up for everyday use, but there would need to be one staff member who was skilled enough to tackle any technical problems that may occur. The teacher also echoed Peppard's thoughts about the time, perhaps five years, needed for teachers to take up a new technology. She felt teachers were wary of replacing their traditional strategies with it; nevertheless, teachers at the in-service seminar were observed expressing a strong interest in its educational possibilities.

While *interest* was rated 5, the teacher, who also had experience with *The Aussie Barbie* as an in-service tutor, intimated that such in-service sessions needed to be followed up with on-the-job help in integrating interactive videodisc technology in individual teacher's classrooms and strategies. She felt *The Aussie Barbie* was "underutilised in her institution; teachers are more comfortable with older ways, such as photocopying worksheets, rather than trying to integrate a new technology".

Despite these reservations, the teacher was enthusiastic about the package and devoted to its application in developing adult literacy. For her, its strengths lay in the educational possibilities. The important teaching/learning criteria, namely, *objectives, outcomes, approach, and learning*, were rated very highly at 7, 6, 7, and 7 respectively. It was felt that the package was based on sound principles of learning and current thinking on language and on literacy development. The teacher was impressed with the realistic social context for language use, the theoretical base consisting of a communicative rather than a skills-drill approach to learning, and the ease with which the interactive videodisc technology allowed students to exploit the moving and still images; for example, through choice of topic or language function to suit their interest or need, and through selection of process such as reviewing, branching, or going to an exercise on the sequence with the pedagogically sound availability of immediate feedback on their answers. "Above all, they become active rather than passive learners."

The technology was seen by the teacher as the best available vehicle for the provision of vicarious examples of language in social use. The ideal but impractical solution would be to use first-hand contacts that students have within their everyday environment; but students are reluctant to use these, mainly because they are afraid of making mistakes and because of the insecurity stemming from a lack of familiarity with the culture. *The Aussie Barbie*, being at once a simulation and a metaphor for Australian society, allows them a framework of security in which they may take risks with their language, and learn about the culture of everyday Australia at the same time.

While the package defines its central objective as the development of social conversation skills, the teacher believes that such oral work is a firm and necessary base for fostering literacy. Moreover, the activities not only include many involving reading but also could easily be extended to help develop reading and writing. Many sequences require students to read text on the screen, for instance in choosing a response during interaction with a character, and in the multiple-choice comprehension exercises (especially in the higher level exercises, given that many of the lower level ones incorporate visual collages as a means of offering alternative answers).

One of the computer disks which comes with the package exploits the slides to explore the suburb of Goodwood; a visual tour is supplied from the slide bank on the videodisc, but the amount of overlaid text means that this exercise is essentially a reading activity. While the package is commercially a completed entity, with further financial investment, other floppy disks encompassing sets of exercises focusing on reading and writing could be developed. The teacher also suggested the slide bank could be used to derive stimuli for writing once students had developed conversational strengths from using the package. Sets of slides organised around a topic such as "visiting the doctor" can be selected; in this case related written text centred on illness and activities incorporating reading and writing could be integrated into a lesson.

Finally, *flexibility* and *ease of use* were both rated 5 by the teacher It was noted that, while it took longer to set up the work station for use, laser access to different parts of the motion sequences and to individual slides was quicker and did not cause damage to the original image. As a result the life-span of the resource was increased far beyond that of video-tape and film: "no long wait while video-tape is rewound if sequences need repeating". Nevertheless, the teacher preferred to use the touch screen rather than the remote control, even for presentation lessons. She felt the touch control was more convenient, and it was a simple matter to connect a large monitor for the class to watch while she manipulated the touch screen to select the sequence required. It was also pointed out that the hardware has a port for headphones so that individuals could use the package in a classroom without disturbing other students. She confided, however, that she thought most educational benefit came from use by students in groups of two or three.

The Aussie Barbie was seen as extremely user-friendly: "Students take to it like ducks to water; because of the simplicity of the touch screen control, the complexity of the technology is completely invisible to them". Teachers, however, are sometimes bewildered because the resource is so rich in possibilities, and frequent reference to the documentation is necessary to get the best educationally from the package. While the technology does not need long to master, the teacher reiterated that there is a need to provide follow-up support for teachers beginning to integrate the technology in their classroom. She closed by stating that their problems with it were mainly attitudinal.

From an administrator's point of view

The institution whose deputy-principal was interviewed had been involved in its development and had been using *The Aussie Barbie* since its trialling in 1987. He felt that the package was "as good an example of its kind as you could get". Accordingly, his ratings on the generalised criteria were very positive towards the package. As seen in **Table 9.3**, no rating fell below 5 on a seven-point scale, where the higher the rating the more favourable was the reaction:

Table 9.3: *Ratings of The Aussie Barbie on seven criteria from an administrator's perspective*

Criteria	Rating
Objectives	7
Outcomes	5
Approach	6*
Access	5
Management	6
Service/support	5
Costs	6

* The rating for *Approach* was based on responses to three sub-sections:

• Does the technology offer new approaches to teaching/learning?	7
• Does the technology enable educational activities that other technology cannot?	6
• Are teachers supportive about the approach adopted?	5

With respect to *approach*, it will be noticed that individual responses to the subheadings were deemed necessary. The administrator believed that the technology certainly offered new approaches to teaching/learning, especially in its ability to present "as natural language as you can get outside of real life situations". The method of directing the actors by giving them outlines and allowing them to create the detailed dialogue had helped the natural flow of language; moreover, the use of a point-of view camera technique associated with student interaction had consolidated this reality for the student.

The active nature of the learning process and the possibility of capturing real language in a way very manageable for the student, were seen as strengths of interactive videodisc technology: "It hasn't been as easy to branch as readily on audio and video tape, or to offer quick random access to pertinent images". Nevertheless, he saw that teachers needed help to adopt the technology despite their recognising its educational advantages. Some of their reluctance he put down to the traditional Luddite reaction and its fears that such a remarkable technology may eventually put them out of a job.

The clearly stated objectives were seen to be important educationally and the package the best of its kind despite what was noted as a compromise in its development. In the context of his institution's being concerned solely with a wide range of adults learning English as a second language, *outcomes* was rated at 5 rather than higher, mainly because of this compromise. It came about because the videodisc, the first of its kind in the area, was made as a demonstration model of what could be done. Instead of being purpose-built for his migrant education setting, the content was made more general. He would have preferred the content to have concentrated on English for special purposes, such as engineers talking to engineers and doctors communicating with patients, since many of his adult clients are professionals trying to re-enter their professions in Australia.

As it happened, this was considered likely to lead to a less unified content unsuitable for a first production, and the decision was made to concentrate on topics of everyday conversation. The administrator indicated a need for more interactive videodiscs which captured the language of a variety of professional areas since he saw computers, CD-ROM, and interactive videodisc being "in a world of their own" compared with video and audio tape, textbooks, and slide projectors; and interactive videodisc, he maintained, was "the top of the tree".

Given the cost and the lack of portability of the work station, he felt access to the technology would probably be only through an educational institution; but students would find little difficulty using the technology because of the high transparency provided by the touch screen control and Level 3 mode of operation. In addition, he reported the station can be adequately made operational by teachers, and that, although his institution had a technician on staff, there had been no service problems in two and a half years of use. Only suitably designed furniture to house the work station had escaped their attention. Given the high educational value of the package and despite the present relatively high cost of work stations in the Australian context, the costs were seen as "pretty reasonable" and "some teacher savings" were envisaged.

This administrator "couldn't speak too highly of the potential of interactive videodisc technology". He foresaw its uses for special language purposes as indicated above, for dealing with register, and for treating other language variations. From the wider literacy point of view, he saw the advantages of being able to overlay subtitles in students' own languages on the disc's moving and still images; and, as the interviewed teacher had, noted the possibilities of authoring appropriate computer programs to foster reading and writing development through interaction with those images. He expressed the hope that such authoring for *The Aussie Barbie* would not stop with the present commercially available floppy disks.

Finally, the administrator said he would like to see future disks develop any multiple choice questions in exercises to include feedback on why a particular response was wrong, and to provide branches offering remedial activities. At present with *The Aussie Barbie*, a student may review the sequence on which a wrongly answered question was based before attempting the question again, and often can ask to see other examples of any particular language use from the images stored on the videodisc.

Conclusion

The conclusion to this case study is presented in two sections. First, an evaluation of *The Aussie Barbie* as an application of videodisc technology to adult migrant literacy development is attempted. The second section looks to the future in estimating the potential of the interactive videodisc medium for use in adult literacy development programs.

The Aussie Barbie: an evaluation

The reactions of students, teacher, and administrator were most favourable towards *The Aussie Barbie*. Granting the teacher's observation that the complexity of the work station impedes its portability and balancing her judgement of low adaptability with the richness of the resource, it is not difficult to accept the administrator's view that this application of interactive videodisc is "the best of its kind" and that interactive videodisc is technologically "top of the tree". Certainly, analysis of the package and direct observation of its use indicated that *The Aussie Barbie* has technical, theoretical, and pedagogical strengths with respect to the fostering of language development in adult learners of English as a second language.

Technically, the disc is well designed and the interaction afforded by the computer interface deftly exploited. Production values in the motion sequences were high, and the use of a point of view camera adds to the effectiveness of the resource for a learner. There was no evidence in this study to support the negative comments made by teachers on the content reported in Anderson and Field (1988: 12). The touch screen contributes immensely to the ease with which students who are beginners in the learning of English can access the resource. The user-friendly software offers such students icons which provide quicker orientation than any text and keyboard.

Theoretically, the concept of this interactive videodisc is soundly based on a communicative view of language learning. The natural language sequences provide a realistic social context for student use of English. Students do not meet text in a vacuum, but have access to the important paralinguistic, non-verbal, and cultural features of the English language. Language development is centred in aural/oral interaction and quickly leads to concurrent modelling and text-based activity. Olson (1984) and Wells and Chang (1989) have tracked and emphasised the important oral antecedents of literacy.

The representation of natural language on video offers a realistic context but, of course, pictures are less complex than reality. Interactive videodisc establishes a nice balance between language representations divorced from paralinguistic and non-verbal features on the one hand, and the uncompromising, especially for the illiterate, settings of real life on the other. While the learner is afforded a communicative environment in which to construct meanings, exchange thoughts, feelings, and knowledge, and thereby create new knowledge and understandings, the interactive videodisc also provides security in a simulation where the learner has control of the situation. In many ways, in the case of learners whose English is not well developed, a complex realistic simulation might be considered a better language-learning environment than real life experience.

Pedagogically, the learning environment provided by *The Aussie Barbie* is responsive to student's needs and motivations, task-oriented and purposeful, highly interactive and resource-based; it allows for negotiation of topic and activity, gives students immediate feedback on their reponses to comprehension exercises and in their interaction with characters, can be used by individuals or in group settings, and is based on respect for the individual student. While the videodisc brings a rich natural language resource, its interactive features provide a level of opportunity for student control that fosters the development of autonomy rather than dependence in the classroom. The observed high level of student interest, activity, and enthusiasm served to confirm these pedagogical strengths.

Interactive videodisc: the future

The highly positive language-learning features of *The Aussie Barbie* might well be extended to other applications of interactive videodisc to adult literacy development. The administrator who was interviewed noted that what might be normally be seen as a prohibitive capital cost, is in reality very cost effective educationally. In some ways one might say there is a *Catch 22* situation with the cost structure of interactive videodisc in Australia. Unless appropriate discs are developed, their cost remains relatively high and the demand for work stations low. Low demand for videodisc technology keeps the hardware price high too, so the demand for the software stays low.

When interviewed, Peppard, the creative designer of *The Aussie Barbie*, pointed out how cheap the discs and hardware had become in the United States as a result of widespread use of the technology; often videodiscs cost as little as $15 and hardware about half the Australian price. Unfortunately the American NTSC system is not compatible with the Australian PAL video format.

Meantime, there is some Australian activity in the production of interactive videodisc related to language learning. Peppard drew attention to two projects being conducted in Adelaide. The first is the production of a videodisc based on the SBS television program, *Hello Australia*, which contains twelve major sequences and a further one hundred ranging from a few seconds to forty seconds in length. The intended audience is learners of English as a second language, and in terms of difficulty is pitched at an ASLPR of 0+ to 3. The second new production is an interactive videodisc called *Communication Strategies* with an ASLPR range of 0+ and above. The latter uses a mouse rather than a touch screen, and its language levels are considerably higher than those of *The Aussie Barbie*.

One recalls the interviewed administrator's remarks that his work with adult migrants suggested a pressing need for an interactive disc based on English for special purposes, and the medium is obviously suitable for treating many other variations in English. There is, therefore, clearly scope for extending the application of interactive videodisc technology in adult literacy education with some rich rewards for this area of educational endeavour.

The Aussie Barbie has paved the way for further development in this field. Investment in well designed interactive videodiscs would be economically sound since the laser technology does not wear or damage the disc, thus increasing its life-span. As more discs became available their cost and that of the hardware is likely to fall. Moreover, there is a likely advance in videodisc technology incorporating "write-on" facilities, which would mean that the disc content could be adapted or up-dated. The experience of personnel interviewed in this study, however, has shown that investment in teacher induction and support schemes is also necessary with the introduction of this, or for that matter, any complex technology.

10 Software for Adult Literacy Learners

This Chapter focuses on software that is appropriate for use in adult literacy classes. In the first two sections, the focus is on current applications, while the third section details newer software, referred to as new generation software. The Chapter continues from the case study presented in Chapter 4. There, attention was directed to computers as tools in literacy acquisition: here, we examine more specifically the kinds of computer programs – or software – that have been found useful for adults.

Current applications

To find out what computer software is used by adults in literacy classes, we sought again the assistance of the Adult Literacy Unit (ALU) at Gilles Plains TAFE College in South Australia. First, we needed to develop a set of criteria or reference guide to evaluate software, based on what others have reported as useful. Second, a list was compiled of *all software used* at the ALU, and the hardware that runs it. The compilation also indicates how often the software is used. Third, we examined several pieces of software from this list in greater detail, with the aid of the reference guide we had adopted. The software examined was either designed for adults or for a range of users which includes adults.

Software evaluation in the literature

There is an increasingly large amount of software being designed and produced for educational use or which may be suitable for educational use. For pedagogical (and andragogical) reasons it is important to identify meaningful ways to evaluate these programs. As one computer educator stated:

> Clearly, there is a need to pay careful attention to the selection of computer-based instructional materials perhaps even more so than to the more traditional resources because unfortunately in many cases, once the novelty of the new machine fades, the lack of educational value in some programs becomes apparent (Gare 1982).

In her *Guide to the Evaluation of Computer Based Materials*, Gare (1982) makes particular mention of the lack of published material on software evaluation. Maddux (1988) cites a 1972 study in which researchers asked publishing companies to provide information on software – many of the responses consisted only of a catalogue of materials. Maddux suggests that this may still be the case today and that the onus is on software developers, increasingly educators, to implement proper evaluation studies.

Evaluation criteria

Gare (1982) and, later, Lathrop and Goodson (1983), identified a number of criteria for evaluating software. These included: the role of the computer, the level of teacher involvement, applicability to the curriculum, flexibility in use, the complexity of the response required by the user, feedback and error messages, user friendliness, content and reading ability, appropriateness of graphics, and attractiveness of screen layout.

Wilson and Hooper (1986), in their evaluation of software used for Basic Adult Education in the TAFE sector, were influenced by the concept of student control over the content and strategies of software. Over 70 software packages were examined as part of their project, and software was rejected as not appropriate for use with adult literacy students if it failed on one or more of the following criteria:

1) Inappropriate materials for use by adults.

2) Poor overall format and design of package.

3) Lack of definable educational objectives consistent with the overall aims of basic adult education.

Other evaluation criteria included by Wilson and Hooper (1986), regarded as important in the adult literacy area, were the *objectives* of the package, any *prerequisites* required, and *record keeping* functions. Many of the evaluative comments on language software adopted by Strachan and Hayton (1987) in their general register of software of direct use to TAFE teachers also reflect the general criteria identified in the studies above.

Pritchard, Micceri and Barrett (1989) attempted to provide organised objective evaluation procedures by breaking complex concepts, such as instruction management and user interface, into components small enough for objective evaluation. They found that evaluators tend to pay more attention to presentation than to the instructional aspects of software. Riedling (1989) presents a model of educational software review based on *philosphical, pedagogical* and *scientific* criteria. The key components of the review cover instructional target, educational power, instructional delivery, affective impact, program use, and support elements.

In comparing systematic software evaluation forms with subjective written appraisals or reviews, Schueckler and Shuell (1989) clustered twenty-six empirically indentified criteria into four general categories. The first category, *fundamental program characteristics*, provides basic information to identify the software. *Instructional concerns* includes general concerns related to program usage, prerequisite skills, social interactions. The third category, *principles of learning and teaching*, includes concerns over feedback, motivation and consistancy with learning theories. Finally, *overall rating*, is an overall judgement of either compiled scores or subjective rating. Schueckler and Shuell make the point that evaluation is best thought of as a process. and checklists and reviews should only serve as guides to assist the evaluator in reaching decisions appropriate for a particular situation. Lastly, software evaluation. according to Schueckler and Shuell, should be at two different points in time:

> Software should be evaluated first, when it is initially selected for classroom use, and second, the extent to which the selected software works effectively in the classroom setting should be evaluated.

The criteria we applied to evaluate software for adult literacy use were based on the criteria identified by Schueckler and Schuell (1989), on the information included in the submission form for the TAFE Software Register (Strachan and Hayton,1987), the TAFE Software Evaluation of Wilson and Hooper (1986), together with ideas synthesised from Rielding (1986).

Reference guide

The intention was not to operate the criteria as a checklist, but rather as a reference guide to help identify key strengths or weakness in software. Thus for each piece of software, information under the twelve headings in **Panel 10.1** was gathered. All software was evaluated using this reference guide; wherever possible, the software was observed in action by students.

Panel 10.1

Reference guide for evaluating computer software

- *Identification*
  Name, Subject Area, Publisher, Cost, Author
  Type of program (e.g. Drill and Practice)
  Target users (Who was it designed for?)

- *Technical details*
  Hardware required
  Peripherals required (e.g. printer, colour monitor)

- *Ease of operation*
  Error messages, Help functions and directions, Loading, Saving and Exiting
  Screen readability, Screen layout
  Effective documentation

- *Enhancements*
  Sound, Speech, Graphics, Interactivity

- *Stated objectives*
  Well defined objectives
  Empirical evidence that students attain stated objectives

- *Content*
  Accurate, Error free, Educational
  Presented in small steps
  Appropriate for user level and interest
  Offers variety

- *User orientation*
  Can the level of operation or speed of presentation be altered by student or teacher?

- *Interaction*
  Stimulating, Challenging
  Encourages group interaction

- *Cognitive level*
  Content based on one or more cognitive levels such as knowledge, application, and evaluation.

- *Feedback*
  Effective, Appropriate, Scores responses

- *Evaluative teaching methods*
  Pretest, Posttest, Record keeping, Diagnostic testing.

- *Prerequisites*
  Are specific skills required for learner success?

Hardware at the Adult Literacy Unit

The following computer hardware was available for use at the ALU:

- An NEC APC IV (IBM clone), with 640K RAM, a hard disk and a colour monitor.
- A Texas Instruments 99/4A, using solid state program cartridges, colour monitor and speech synthesis adaptor.
- A Sanyo MBC-1000 with monochrome monitor.
- Two Apple clones with monochrome monitors.
- An IBM PC with twin drives, monochrome monitor, and daisy wheel printer.
- An Apple // plus with twin drives and printer.
- An Apple //e , with a colour monitor, twin drives, Imagewriter printer and Echo GP speech synthesiser.
- A Macintosh Plus with external 400K drive.
- A Macintosh Plus with external hard disk, external drive, and Imagewriter // printer.

Software lists

There was a considerable amount of software available at the Adult Literacy Unit, well over 200 programs in all, justifying the claim (see Chapter 4) that it was one of the better equipped units in the state. What follows is a listing of 72 pieces of *current* software used at the ALU.

The indicators under the *Use* column show how often each piece of software was used:

***	used regularly
**	used often
*	used now and again

Further, in all Tables that follow, the information on *Hardware* refers to the actual system being used at the ALU. Many of these programs are available for a range of computers though this is not indicated in the Tables. *Origin* refers to the publisher, and where that information was not available, the distributor.

Drill and practice

Table 10.1 shows the drill and practice software used at the ALU. Drill and Practice software is characterised by batteries of questions that keep the user focused on a particular skill.

Table 10.1: *Drill and Practice software used at the ALU for provision of adult literacy learning*

Title	Origin	Hardware	Use
Road Law	Public Domain	IBM, Apple	**
Lex, Wizard of words	Reckon Software	NEC, IBM	**
Algebra 1	Conduit	Apple	*
Arithmetic 1	Public Domain	Apple	*
Guess the word	SA Education Department	Apple	**
Fred Fraction Says	Public Domain	Apple	*
Spelling: Read, Listen, Write	Adelaide, TAFE	Apple	*
Vocabulary (3 disks)	Adelaide, TAFE	Apple	***
Homophones	Adelaide, TAFE	Apple	*
Decimals & Tests (2 disks)	Adelaide, TAFE	Apple	*
Spelltronics (3 disks)	Educational Activities Inc.	Apple	**
Cross Clues	S.R.A.	Apple	**
Elementary Vol 7	MECC	Apple	**
Elementary Vol 5 Prefixes	MECC	Apple	*
Elementary Vol 12	MECC	Apple	*
Elementary Vol 1 (Games & Drills)	MECC	Apple	*
Mathvader	SA Education Department.	Apple	*
Mathbooster	SA Education Department.	Apple	**
Computer Generated Maths	MECC	Apple	*
Growgin's Fractions	MECC	Apple	**
Adventures with Fractions	MECC	Apple	*
Oh, Deer	MECC	Apple	*
Decimals (4 disks)	Public Domain	Apple	*
Fractions	Control Data	Apple	*
Spelstar	Micro Pro. Int.	NEC	*
Hunt the Wumpus	Texas Instruments	TI	*
Hangman	Texas Instruments	TI	*
The Attack	Texas Instruments	TI	*
Addition & Subtraction	Texas Instruments	TI	*
Houshold Budget Management	Texas Instruments	TI	*
A-maz-ing	Texas Instruments	TI	*
Division 1	Texas Instruments	TI	*
Alien Addition	Texas Instruments	TI	*
Reading Round-up	Texas Instruments	TI	*

Total Drill and Practice used: 42
Percentage of all programs used: 58%

Shell/Word and text manipulation

Table 10.2 shows shell or word and text manipulation type programs. These programs allow users to create their own learner material using an existing structure. The user can make decisions about the text and has a great deal of control over what is done within the program.

Table 10.2: *Shell/Word and Text Manipulation software used at the ALU for provision of adult literacy learning*

Title	Origin	Hardware	Use
Interactive Reading	Gilles Plains TAFE	NEC, IBM	**
Gapmaker...Gaptaker	Prologic	Apple, IBM	*
Printshop	Broderbund	Apple	**
Working with Words	Prologic	Apple, IBM	*
Text Detective	Flinders University	Apple	*
MacPaint	Apple	Macintosh	**
MacDraw	Apple	Macintosh	*
Tie Tracer	Jacaranda	Apple	*
Designing an Energy Efficient Home	Prologic	Apple	*

Total Shell/Word and Text
Manipulation programs used: 9
Percentage of all programs used: 12.5%

Word processing

Word processing programs allow text to be entered, corrected and published for others to read. Those used at the ALU are shown in **Table 10.3**.

Table 10.3: *Word Processing software used at the ALU for provision of adult literacy learning*

Title	Origin	Hardware	Use
Bankstreet Writer	Broderbund	Apple	***
Macwrite	Apple	Macintosh	***
Wordstar	Micropro International	NEC, IBM	**
Word	Microsoft	Macintosh	**

Total Word Processing programs used: 4
Percentage of all programs used: 6%

Adventure programs

Adventure programs (**Table 10.4**) provide an environment where stories or adventures involve the user in control of strategies. This type of program has evolved into graphics-dominated adventures as compared to text-dominated adventures of a decade ago.

Table 10.4: *Adventure software used at the ALU for provision of adult literacy learning*

Title	Origin	Hardware	Use
Where in Europe is Carmen Sandiego?	Broderbund	Apple //e	***
Eamon	Public Domain	Apple	*
Galactic Empire	Broderbund	Apple	*
Fantasy Isle	Prologic	Apple	**
Take a Holiday	Prologic	Apple	*

Total Adventure programs used: 5
Percentage of all programs used: 7%

Tutorial/ other utilities

The tutorials and other utilities in **Table 10.5** include programs that can be used for information management and technology skills such as *How to use a computer* and *Typing Practice.*

Table 10.5: *Tutorial/other utilities software used at the ALU for provision of adult literacy learning*

Title	Origin	Hardware	Use
Apple Presents Apple	Apple	Apple	**
Apple Tour of Macintosh Plus	Apple	Macintosh	**
Bankstreet Writer Tutorial	Broderbund	Apple	*
MasterType		Apple	**
PC Fast Type	Techtrend Corp	NEC	*
Computer Literacy	Apple	Apple	**

Total Tutorial type programs used: 6
Percentage of all programs used: 8%

Operating programs

Operating programs (**Table 10.6**), are required to boot or startup the computer, or to allow other software to run.

Table 10.6: *Operating programs software used at the ALU for provision of adult literacy learning*

Title	Origin	Hardware	Use
Appleworks and startup	Apple	Apple	**
Dos 3.3 System Master	Apple	Apple	*
SLE Boot disk	IBM	IBM	**
OmniEdit	Public Domain	NEC	*
DBase 2	IBM	NEC	*
System Disk	Apple	Macintosh	**

Total Operating type programs used: 6
Percentage of total programs used: 8%

Key points to emerge

Some key points are evident from this cursory examination:

- There were considerably more drill and practice programs used than any other type of program.
- There were many programs (over 100) that were available but were not used for various educational and management reasons. Many of these were drill and practice and adventure programs, available as public domain software.
- Much more software was available for Apple computers than for other machines.
- Word processing programs were used on a regular basis on almost all the machines. Although this was the most regular use for the computers, it is not reflected in the range of software available.
- The Texas Instrument software did make use of quite good quality speech synthesis. However, because of the age of the machine and its limited existence in adult literacy classrooms, this software was not included in the *new generation* software category discussed in the next section.
- The emergence of shell type programs is quite recent. These programs are all late 1980s programs and reflect a greater emphasis on user control and creative, flexible use of learning materials.
- Tutorial programs to teach technology skills were used quite regularly. These programs were used to familiarise students with the way a particular program or hardware worked, or to practise keyboard skills.

- The use of operating programs highlights the need for teachers to be familiar with startup and organisational procedures. Sometimes it is not simply a matter of turning on the computer and running a program.

There is a very broad range of programs represented at the ALU. Of significance is the small number that are stated as being designed specifically for adults or for a broad range that includes adults. This does not mean that all programs designed for children are inappropriate for adults; it is obvious from these lists that this is not the case. However, it does reflect the poor status given to this user group of adults in designing and producing software.

Focus on specific programs

This section deals with some of the programs that are claimed to be designed for adults, or for a broad range of users including adults. Six programs are examined in detail, all of which have been successfully used at the ALU. The three drill and practice programs are *Lex Wizard of Words, Road Law* and *Vocabulary. Interactive Reading* and *Text Detective* are two shell programs examined. Finally, *Where in Europe is Carmen Sandiego?*, an adventure program, is considered.

Lex, Wizard of Words

Lex, Wizard of Words is claimed to be an *educational adventure game* suitable for ages 10 to retirement. It is, however, very much a drill and practice program within an adventure game format. It requires an IBM PC running MS DOS 2.0 or higher. At the ALU it is loaded onto the NEC's hard disk and selected from the startup menu. The package provides for both 5.25" and 3.5" disk drives. A colour monitor is required to make use of the attractive visuals.

Objectives

This is Reckon Software's description of the program:

> *On a journey through forest trails you will encounter obstacles of increasing difficulty, involving synonyms, antonyms, homophones, alphabetical ordering, spelling demons, borrowed foreign phrases, collective terms, anagrams, and heteronyms.*
>
> *Along each of the eight trails you will be successively halted by implacable word wardens who challenge you to provide single word answers to their puzzles. Following an incorrect guess you will be given a further clue by one of the helpful forest companions, until you type in the correct answer when you will be allowed to pass. Should you exhaust all clues, the Spelling Serpent will give you one last chance to continue. Mostly you will be able to solve the puzzles at your leisure, but some types do have a time limit.*

The screen

The screen is attractively designed. A tree lined trail leading to the castle of the *Lord of Lex* is displayed in the top portion of the screen. The rest of the screen represents two main areas. To the left, a *Word Warden* holds up a banner displaying a word or phrase; this is the user's challenge. To the right, four *Forest Guardians* hold banners which will display clues to help the traveller answer each of the Wardens' challenges.

The clues provide single digit or letter information on the number of vowels in the word, the length of the word, the first letter of the word and the last letter of the word.

Using Lex, Wizard of Words

When a traveller is first presented with a problem, there are no clues apart from the fact that the type of challenge is determined by the warden presenting it. For example, if the *Synonym Warden* holds up a banner with *large* in it, the traveller knows that a synonym for *large* is required. The clues are uncovered one at a time after each incorrect attempt at a word.

After each response by the traveller, comes a range of text feedback accompanied by musical tones. Some of the messages for correct responses are: *At Last, Got it, Yes, Just So.* For incorrect reponses the messages may be: *No, Sorry, Oops!, Oh Dear, No Good.* These responses are not especially highlighted; they are not a prominent part of the program but they are effective.

The *Spelling Serpent* appears if the word has not been solved by the time all clues appear. It presents the traveller with a misspelt word. If the word is corrected, then the answer to the challenge is revealed.

Learning strategies

The user is confronted with a large bank of words and because of the structure of the program, there is a variety of challenges which adults, in particular, find very attractive.

There is no control over the contents of the program. However, the words seem to be quite suitable for users with a range of reading skills. There is no on-screen help available apart from an indentifying initial on each of the characters. The user must remember the roles of each of the characters. Apart from choosing words, correct spelling is essential. Thus even to be able to save or quit, the user has to learn to type these words accurately.

The most significant aspect of this program is the way it encourages the user to interact with other people and other media. This should be ideal for use with groups of readers. Beginning readers may find it too difficult to work alone. Encouraging the use of dictionary and thesaurus to help solve the challenges is an excellent way of linking media and practising information retrieval skills. Because the tasks are presented in small steps, and the sound and animated graphics work effectively, interest is maintained for the adult user.

Lex, Wizard of Words, is different from most drill and practice programs in that the learner does not feel under pressure to perform against the clock or to beat a previous score. The challenge is to get further into the adventure; this is the real scoring system. There is also the option of saving the current position which means that the user can return to the program at another session. The tasks involve plenty of thinking.

This program does not present words in context. Perhaps this is why *Lex, Wizard of Words* may not be as successful with the beginning reader, unless that person is operating with a teacher or with peers who could provide context clues.

Road Law

Copies of *Road Law*, a public domain program, run on the ALU'S IBM and Apple computers. *Road Law* is an example of a drill and practice program with a real life application. All the information presented is relevant to the user's preparation for getting a driver's licence. The South Australian version, adapted by Don Strempl, begins with this explanation:

> *This is a program designed to assist you in preparation for your 'Learners Permit Test'. The program consists of two parts. The first part contains twenty questions and the second part is seven intersection* problems – *'Which vehicle must proceed first?'. The program has been designed to be as close as possible to the learners permit test questions. If you get more than three questions wrong in the first part, you will be directed back to further study of the RTA booklet. If you get more than one of the intersection problems wrong, you will be directed back for further study of the booklet.*

Using Road Law

In the first part of this program, the user is presented with a battery of multiple-choice questions and has to select the correct answer from a choice of three. The sort of question posed is of this type:

> *Is a driver, turning at an intersection, required to give way to pedestrians?*

One of the limitations of this program is that the user's response is not fedback immediately. The user does not know whether a question has been answered correctly or incorrectly! When three errors have been made, the program automatically ends with a police siren cue and an invitation to further study the Road Transport Authority (RTA) booklet. The user has to investigate what the correct responses were from the RTA booklet. Progress through the 21 questions is, therefore, dependent on reading accurately and thinking about the situation in question.

The screen is quite bare and all text is presented in upper case. With minimal readers, there is a need for another reader as tutor. The second part of *Road Law* involves seven intersection problems where the user has, simply, to read animated two car situations. The screen is much more interesting, being filled with a graphical representation of the problem.

The instructions are simple. The cars, labelled A and B, are shown moving towards an intersection and the user must press the A or B key to stop the car that should give way. If the wrong key is pressed, or if one is too slow to respond, a crash results. Thus, there is immediate feedback for the user. If the user makes more than one error, the program finishes.

Unfortunately, making one error also results in a response of *You have made more than one error, please refer to the RTA* ... If the user successfully answers seven out of seven questions, the reponse is: *You have done very well in both sections of this program, you should do well in your learner's permit test.* and *All the best, drive safely please.* The sequences are clearly illustrated and sound effects add to the interest.

Road Law could be improved. For example, it could be modified to provide better feedback in the first section. However, it does provide practice in a relevant context for the learner and, as such, is something of a starting point in providing more relevant drill and practice programs. It is a popular program at the ALU.

Vocabulary

Vocabulary is part of a series of traditional drill and practice programs. There are no frills here; no sound, no colour, no graphics. This is straight to business. Running on an Apple computer and monochrome monitor, there are 21 vocabulary quizzes on the disk. The program loads quickly and is setup so that the user can have a print out of the selected quiz.

Using Vocabulary

In *Vocabulary*, all text is presented in upper case. The user can select the number of exercises to be answered; the program will allow more than a hundred exercises to be selected. Typically:

```
1. WHAT DOES GRACEFUL MEAN?
      1. - ELEGANT
      2. - CHIEF
      3. - MEETING
      4. - IRRRITATE
      5. - SAD
```

The response must be a number. If a word is typed in, the program responds with *REENTER* and, eventually, if a number is still not typed, the response will be *I NEED A NUMBER FROM 1 TO 5*. At the conclusion of the exercises, the user is given a score and a percentage ... followed by *WANT TO TRY AGAIN?*

Other programs in this series include *Spelling* and *Homophones* and they all follow the same format.

Spelling for example looks like this:

```
QUESTION 1 IS
THE _ _ _ _ _ _ _ _ _  OF THE RIVER LOOKED VERY CA
LM
      1) SERFACE
      2) SURFACE
      3) SURFASE
      4) SIRFACE
TYPE THE NUMBER OF THE ANSWER ONLY.
```

An incorrect answer receives this response:

```
YOUR ANSWER WAS INCORRECT
THE CORRECT ANSWER WAS
SURFACE
PRESS RETURN TO CONTINUE
```

Vocabulary and related programs are used quite frequently at the ALU. These programs, through the range that is offered, provide word practice for specific skills, ranging from words in isolation to words in context. Programs like *Vocabulary* are simple to operate, and because they can be easily printed, they offer some flexibility. Feedback is immediate and basic. The programs do not allow teacher input of word lists and they do not provide record keeping. Certainly, speech feedback would transform these programs. There are enough programs of this type available to provide something for a broad range of users.

Interactive Reading

Interactive Reading was developed by Don Strempl (Gilles Plains TAFE), together with programmer, John Davey. This program allows any learning materials or student generated texts, stored as standard ASCII files, to be converted to *reading input* exercises – basically computer generated cloze exercises. *Interactive Reading* deletes words as in normal cloze exercises but, and this is the innovation, also provides alternatives from the actual text for users to choose the appropriate word to complete the exercise.

Interactive Reading requires an IBM or compatible PC with a minimum of 384K RAM. At the ALU, the program is used on a NEC computer, and selected from the hard disk menu, with student data files on floppy disk. The program presents the user with an extensive array of choices via the main menu:

```
Exit Interactive Reading
Help
Read Personal Scores
Change Your Password
Try a Test Exercise
Create Another Test
Print a Test Sheet
Print the Test Index
Print Student Records
Add a Student to File
Review a Student Record
Clear a Student Password
Remove a Student Record
Select Data Disk Drive
Initialise Student Log
```

Creating reading tests

Reading input tests are created by using text from any word processing program that allows the user to save in ASCII format. For example, *Microsoft Word* and *Wordstar*, two word processing programs used at the ALU, allow files to be saved as unformatted or non-document files which can then be used with *Interactive Reading*, by selecting the *Create Another Test* option from the main menu. The programmer, John Davey, has also created a simple word processor, *Writer*, which allows easy entry of text files.

Once in the *create* routine, the user can select from a range of parameters that will determine which words are deleted and how the alternatives (the distractors) are going to be selected. The alternatives are selected from the surrounding text. *Interactive Reading* does not overwrite the original document, it creates two new files, one for the alternatives, and one for the test.

A test exercise

The exercise in **Figure 10.1**, (Strempl 1988), provides an idea of the on-screen structure of an *Interactive Reading* test. In this example, starting from the first deletion, every twentieth word is deleted and the alternatives are selected at random from within twenty words of the deletion. Because the alternatives are selected from the text itself, the reading level of the overall exercise does not change. Further, this shell program allows the teacher to provide greater flexibilty and relevance for the learner, by being able to use texts that the student has produced or has a specific need to read and understand. Text can also be scanned into the program.

The user is provided with information on score and time taken to do the exercise. Moving through the text is simple; there are a number of alternatives to the arrow keys. The user is given immediate feedback about the status of a selection. If an inappropriate word is selected, there is a soft beep and the correct selection appears, in brilliant white, above the incorrect word.

```
Many trade tests are written in a style of language which is
unfamiliar  to  many  students  in  TAFE.  Apprentices  often
underachieve in their courses because     [ ] prose
                                          [ ] they
                                          [ ] books
have difficulty in understanding the technical prose of the books,
worksheets and other written materials that they have to
[ ] because
[ ] read
[ ] the
Many instructional materials are difficult to comprehend because
the words used are unnecessarily abstract and the sentence and
paragraph  [ ] structure
           [ ] they
           [ ] ideas
needlessly complex. Students can cope with new and difficult ideas
far more easily if they are presented in simple
[ ] straight
[ ] presented
[ ] difficult
forward language.
```

Figure 10.1: *Interactive Reading provides cloze exercises with alternatives created from the text*

Interactive Reading is the result of a teacher working directly with a programmer. There are useful management features which allow student records to be updated automatically and student privacy to be maintained with passwords, while also allowing supervisor access to records and texts. The student records include information on average score, number of tests attempted, average time taken and percentage correct.

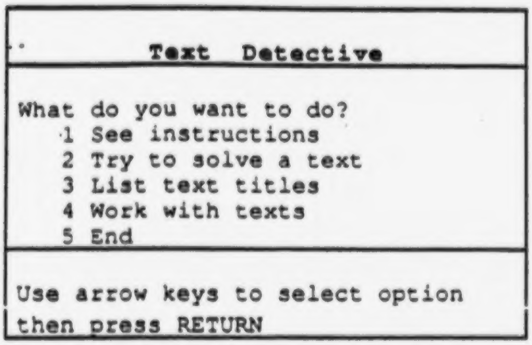
Text Detective

Text Detective (developed at Flinders University) is another program that makes use of the whole language approach to learning. It is a multi-purpose tool for creating text, manipulating it, and reasoning with it. The user is able to determine at what frequency word deletions are going to appear in a piece of text and then take up the challenge of solving the text.

Text Detective runs on the Apple //e and only requires one disk drive. It is accompanied by an excellent Teacher's Guide with many suggestions for learning applications. The Teacher's Guide is biased towards school student use. However, the program is suitable for *students of all ages and abilities*.

Using Text Detective

The program disk stores a number of text sample files. When option 2 is selected from the starting menu, shown in **Figure 10.2**, any choice from these texts is available.



```
              Text  Detective

What do you want to do?
    1 See instructions
    2 Try to solve a text
    3 List text titles
    4 Work with texts
    5 End

Use arrow keys to select option
then press RETURN
```

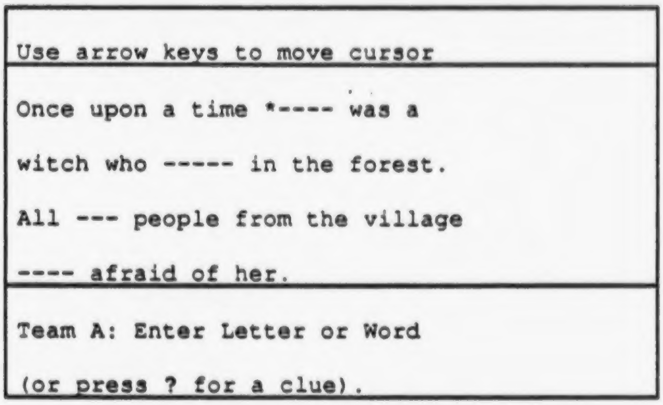
Figure 10.2: *Text Detective. The starting menu.*

Immediately, the user has the option of selecting a challenge level. Five challenge levels correspond to increasingly regular deletions of text.

1 Rookie – every fifth word deleted
2 Sleuth – every fourth word deleted
3 Sherlock – every third word deleted
4 Miss Marple – every second word deleted
5 Super Sleuth – every word deleted

A sixth level, *Moriarty's Challenge*, is a special customised challenge, which only shows up if the text has been customised by the creator, using the *Work with Texts* option.

The example shown in **Figure 10.3** was set up for the Rookie level. This program encourages group work and interaction: groups can compete against each other or individuals can work by themselves. Any blank can be solved by moving the cursor to it and typing in the correctly spelled word. Feedback is immediate and includes a score based on the number of letters solved. Clues are available from the context and from the number of spaces indicating the blank. Further, by positioning the cursor and pressing ?, a missing letter will appear.

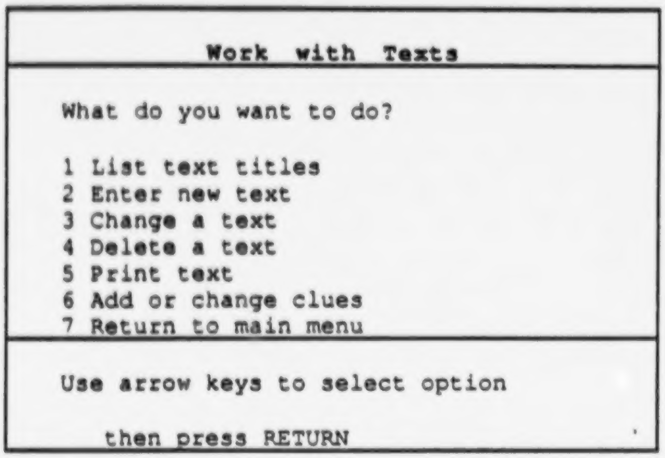


```
Use arrow keys to move cursor

Once upon a time *---- was a

witch who ----- in the forest.

All --- people from the village

---- afraid of her.

Team A: Enter Letter or Word

(or press ? for a clue).
```

Figure 10.3: *Solving text at the Rookie level*

The selection of words to solve and the *buying* of clues involves the user in decisions about strategy as well as decisions about language and meaning.

The ***Work with Texts*** option (**Figure 10.4**) allows users, via a simple word processor, to enter new text and alter and manipulate existing text. A piece of text may not be more than one screen in length. This may indeed appear more of an advantage to adult literacy students than a limitation of the program.



```
              Work  with  Texts

   What do you want to do?

   1 List text titles
   2 Enter new text
   3 Change a text
   4 Delete a text
   5 Print text
   6 Add or change clues
   7 Return to main menu

   Use arrow keys to select option

      then press RETURN
```

Figure 10.4: *The Work with Texts option*

The customising option of adding or changing clues, for the *Moriarty's Challenge*, enhances the flexibility of this program. Any selection of words or letters may be deleted using this option. From the low literate reader's point of view, the manipulation of text at this level is accomplished by simple keystrokes; **W** deletes a word and **L** deletes a letter. This puts tremendous power to create a challenge for other readers, at the finger tips and in the mind of the user.

Where in Europe is Carmen Sandiego?

Where in Europe is Carmen Sandiego? is included here as an example of the need to broaden the range of offerings available to adult literacy students. This is an adventure program which requires users to think and interact. It is a problem solving program that allows learners to use their knowledge and experience in an interesting way.

The program runs on an Apple //e (DOS 3.3) at the ALU and requires a colour monitor. The package includes a user's instruction manual and a *Concise Atlas of Europe*. The program disk has information on both sides; running two back up disks in twin drives is a more convenient way to operate.

Using Where in Europe is Carmen Sandiego?

This program uses colour, sound, and animation to create exciting screens filled with places, characters, maps and files. The user's role is to play detective and pursue a criminal through the cities of Europe. On the way, witnesses can be interviewed, cities can be visited, and clues can become the springboards for reasoning from text. There are four playing options: *See connections*, *Depart by plane*, *Investigate* and *Visit Interpol*. Each selection involves the user in purposeful interpretation of text, not just reading but thinking. This is all the more effective when a group of users is working together, discussing, evaluating information, predicting; doing all the things that create learning successes.

Where in Europe is Carmen Sandiego? challenges the user to make thinking connections between words and their context. Users need skills in using reference materials, using alphabetic order, skimming for main words and categories, reading maps. This program does reinforce the idea that the computer is only part of a learning environment. Users not only respond to information from the screen but they refer to the Atlas, or dictionaries and almanacs, and to the knowledge and experience of their peers in dynamic and exciting ways.

Programs of this type have spin offs away from the computer, for thinking and discussion about a range of issues; travel, crime, savings, work, science and technology. The simple operation of the program and the ability to save the user's current position, suggests *Where in Europe is Carmen Sandiego?* may be very useful for developing adults' thinking skills. The hope is that more programs of this type will be produced specifically for adult literacy learners.

New generation software

The purpose of this last section is to highlight certain *new generation software* available for adult literacy learning. This is in no way intended to be an exhaustive examination. Rather, it is an overview of software at the Adult Literacy Unit (ALU) of Gilles Plains TAFE College. Our examination of software falls into three categories.

First, there is an examination of general HyperCard stacks: a range of possibilities, produced for a range of user ages and abilities. The stacks include two databases, *Australian Wild Flowers*, and *Children's Literature;* two drill and practice stacks, *Concentration* and *Maths Flash Cards*; two scrapbooks, *The Animal Stack* and *Sound FX 13* ; and *Inigo Takes a Bath*, a pictorial adventure stack.

Next, HyperCard stacks with speech are examined. These stacks are *The Adult Literacy Word Processor*, three drill and practice stacks, *Alphabet for Adults*, *Alphabet*, and *Finger Spell*; and then *Aritho*, a drill and practice/adventure stack is.

Finally, other speech capable software is examined. The programs are *Tell a Story*, a shell program; the *Pennsylvania State Adult Literacy Courseware*, which includes drill and practice and word processing; the *Adult Literacy Word Quest*, an adventure game; and a desk accessory, *Talking Keys*.

The software is examined in the context of providing greater diversity for adult literacy learners. Three of the items examined in this Chapter stem from the Institute for the Study of Adult Literacy (ISAL). ISAL is located at the College of Education, Pennsylvania State University. The ISAL courseware programs have been developed over a number of years, field tested, and continue to be piloted and evaluated.

Many of the HyperCard stacks are distributed as shareware and are available as packages compiled by Educorp Computer Services or Apple Computers. For example, early in 1989, Apple distributed a three-disk package called *HyperCard in Education*, with a number of stacks illustrating some direct education applications. The Berkeley Macintosh User's Group has a large catalogue of HyperCard stacks including many external command (XCMD) stacks which enable a wide range of *impossiblities* to become possible. Computer magazines and electronic bulletin boards are bulging with information on new stacks.

Lastly, an increasing number of tours through Apple applications are being presented as HyperCard stacks: *Microsoft Works Tour* and *Understanding Apple Products*, for example. These provide excellent ideas on presentation and scripting.

HyperCard in the literature

HyperCard, a computer authoring language, offers educators a means to produce new and exciting software (Williams 1987, Fiderio 1988, Giamo 1988, Ragan 1988). HyperCard is an object-like computing language (Shafer 1988). There are five types of objects which can be created and programmed within HyperCard.

The first object one encounters when using HyperCard is a *card*; a screen for creating and displaying information. On to this card a user may add other objects: a *background* and *text fields*. The fourth type of object is the *button*, which may be placed anywhere on a field or background. Buttons may be used to create *live* areas on the card. For example, a word in a text field may become *hot* by placing a button over it. This button may be scripted (programmed) to show a hidden dictionary field, or a picture of the word, or any other creative idea, whenever a user clicks the computer mouse button while over the hot word. Buttons may also be used to link cards together, creating networks of navigable information. The fifth type of object is the *stack*; the collection of linked cards which make up a program.

Every object in HyperCard can have a script. Thus all objects may act like buttons; authors may write scripts (mini programs) for them. This is all accomplished by using HyperCard's simple, very English-like scripting language, *Hypertalk* (Begeman and Conklin 1988, Waite *et al.* 1989). Further, the number of objects which may appear on a screen at any one time, is limited only by the memory capacity of the computer. HyperCard is made to take advantage of high storage capacity systems, which is where the most innovative educational uses may well occur.

HyperCard is quite new and consequently most of what is reported in the literature revolves around what it is and what its potential might be. The main thrust seems to be to use its capabilities to design courseware. The Perseus Project (Crane and Mylonas 1988), for example, is an attempt to develop an interactive computer based curriculum on Greek Civilization. Crane and Mylonas chose HyperCard to develop materials that encourage active enquiry rather than passive learning. Numerous such courseware projects are in progress in universities around the world. Harris and Cady (1988) describe the empowering effect on teachers developing stacks for student use.

HyperCard manages to link information so that learners can connect ideas and form webs of association. Fleishman and Bixler (1988) suggest that HyperCard is a way of linking basic skills instruction to real life application for adult learners.

HyperCard stacks

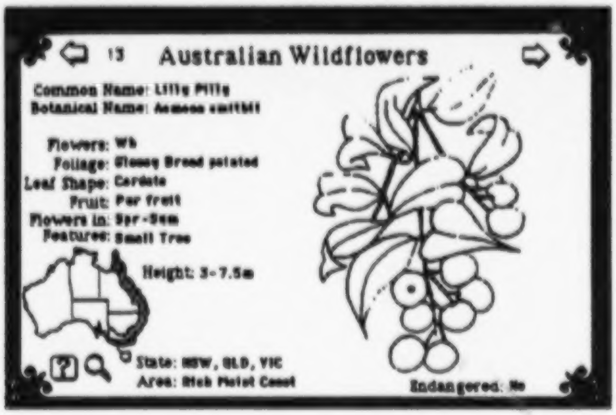
An enormous number of HyperCard stacks is now available. However, many stacks, often by novice programmers, reflect the fact that HyperCard is a tool at the beginning of its potential. What is interesting is that novices can now write programs that previously would have required sophisticated programming skills.

Most of the stacks selected for this section have been designed with children in mind. But they do provide a range of possibilties for adaptation to adult literacy use. The easy adaptability of ideas may indeed prove to be the most powerful feature of HyperCard for adult literacy providers.

Databases

One of the very powerful aspects of using HyperCard is the ease of information retrieval. This has spawned a new and exciting type of database. Gone are the dull business-like fields of data that characterise traditional databases. HyperCard databases are distinguished by graphics, creativity and multiple search capabilities.

The *Australian Wild Flowers* stack, developed in New South Wales by Errol Chopping, provides information on 100 wild flowers. On any wildflower card, twelve fields of information are displayed, plus a map of Australia highlighting the wild flower's most common locations, as well as a scanned illustration of the wild flower (**Figure 10.5**).



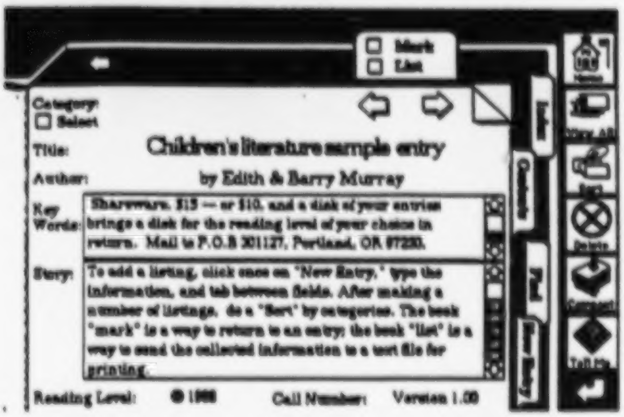
Common Name: Lilly Pilly
Botanical Name: Acmena smithii
Flowers: Wh
Foliage: Glossy Broad pointed
Leaf Shape: Cordate
Fruit: Pur fruit
Flowers in: Spr-Sum
Features: Small Tree
Height: 3-7.5m
State: NSW, QLD, VIC
Area: Rich Moist Coast
Endangered: No

Figure 10.5: *Australian Wild Flowers stack. Transparent buttons allow the user to search the database.*

The stack's search capabilities are quite diverse. By clicking on directional arrows, the user may move from card to card. If the intention is to find out more about other wild flowers in the region, clicking on the map in the appropriate place will immediately transport the user to a related card. Further, by clicking on the ? button at the bottom of the card, a *List Card* is accessed, which allows the user to see a list of every wild flower in the stack, and go to a selected card.

Extra search diversity is provided by the *Search* button, a button with a magnifying glass icon. This button allows the user to search the database, using any of twelve categories. The results of any search are displayed on a *Results Card*. The overall impression of browsing through this database is that information retrieval need not be simply text driven. This is a plus for the low literate reader who needs to use a range of clues to make sense of any set of messages.

The *Children's Literature* stack, by Edith and Barry Murray of Portland, Oregon, has many attractive organizational features for storing and retrieving information on children's books (**Figure 10.6**). The idea is that a teacher or student may use this stack as a means of recording relevant information about a particular book so that others may refer to this when making a reading selection.



Title: Children's literature sample entry

Author: by Edith & Barry Murray

Key Words: Shareware. $15 — or $10, and a disk of your entries brings a disk for the reading level of your choice in return. Mail to P.O.B 201127, Portland, OR 97230.

Story: To add a listing, click once on "New Entry," type the information, and tab between fields. After making a number of listings, do a "Sort" by categories. The book "mark" is a way to return to an entry; the book "list" is a way to send the collected information to a text file for printing.

Reading Level: © 1988 Call Number: Version 1.00

Figure 10.6: *Children's Literature stack. On this entry card are a number of information fields and buttons to search the database.*

The information is stored on an attractive card with fields highlighting author, title, key words, story, reading level and library call number. Like the *Austalian Wild Flowers* stack, *Children's Literature* has a number of buttons to access a range of information. Clicking on the *Contents* button will take the user to a card with eighteen categories. If a user were interested in books on holidays, clicking on the *Holidays* button would immediately call up an appropriate book.

A *Find* button allows the user to specify how and where to look for something. The operation is easy; just click a button. To add new entries, simply click on the *New Entry* button; a template card appears and the typing begins!

Children's Literature is a very well thought out stack. The virtues of HyperCard come to the fore when the following question is asked: *But how can I adapt this to suit my needs?* The answer is quite simple. Everyone of the buttons on this stack, and any other unprotected stack, can be renamed and rescripted to suit the user's needs. This stack could become the start of a Motor Manual or an Employment stack, in the hands of teachers *and* students. To reiterate this point, a quote from the authors of *Children's Literature* is included below.

> I *feel that HyperCard is the tool that will make educational software work (most programs I have seen so far have been written by computer programmers, not educators). I would appreciate it if you would make a copy and pass this program (complete with this documentation) along. Then make yourself a duplicate and click away, if only to learn how HyperCard works.*

Drill and practice

Maths Flash Cards is a one-card stack (**Figure 10.7**). It does, however, allow the user to practise any of the four basic number operations at the touch of a button. To use *Maths Flash Cards*, one merely selects the appropriate operation by clicking on its button. A problem is displayed in large numerals and, after the user has said the answer out loud, the *Answer* button may be clicked.

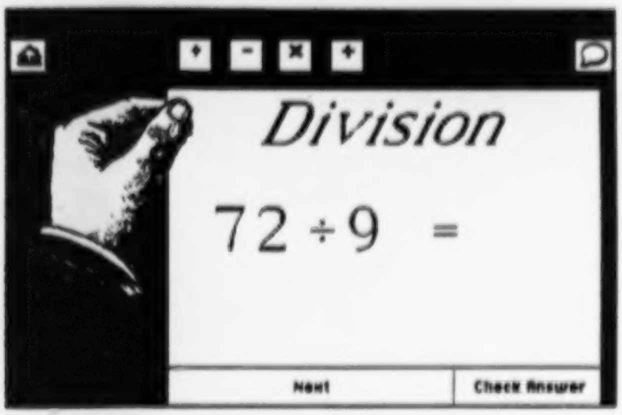


Figure 10.7: *Maths Flash Cards. An operation may be selected by clicking on its button.*

This stack was the result of the stack's author reworking four anonymous maths stacks. The original stacks were 404 cards long and over 65K in size. By scripting numbers and operations into fields instead of having each problem on a separate card, the resulting one card stack was reduced to 11K in size. And, again, the stack is easily modified to provide customised drill and practice maths exercises.

Concentration (**Figure 10.8**), is a traditional memory game that allows users to practise pattern recognition and short term memory recall by matching pairs of icons. Playing this HyperCard version, another stackware product, is not really different from other versions. However, because the user may modify objects, this simple program can become a fully customised *Concentration*, making use of icons that are most suited to any adult literacy learner. This would be accomplished by using an edit program, *ResEdit* for example, to create any appropriate icon which may then be *glued* into the stack and used, by making a simple change to a card script.

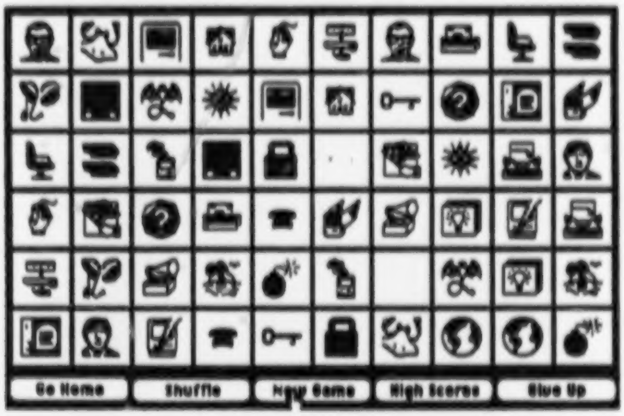


Figure 10.8: *Concentration. Opaque buttons will cover these icons.*

Scrapbooks

Printshop has been a popular program in many educational environments, the ALU included. Part of its appeal are the *Art Gallery Disks* which accompany it and give the user a broad range of art ideas to cut and paste into *Printshop* products. Many HyperCard stacks are scrapbooks full of artwork, for browsing, or as stores of clip art for use in other stacks.

The Animial Stack (v. 1.8) is a twenty-seven card stack with scanned pictures of animals on each card. **Figure 10.9** shows, at the top of each card, the names of the card's animals and directional buttons which allow the user to browse card by card or to view all cards in quick succession. Stacks of this type may simply be used to stimulate thinking about language and experiences. The pictures may be used in other stacks or they may be the beginning shell of a stack where pop-up text fields will provide comments by students on their experiences, thoughts and wishes, and how they relate to the on-screen images.

HyperCard offers many possibilities for the use of sound in programs. *Sound FX13* is an example of the type of sound scrapbook available. It provides the user with a bank of audio possibilities. *Sound FX 13* is a one-card stack with twelve digitised sound effects, ranging from squealing tyres to roaring sirens. Any of these sounds can be added to another stack by copying a button and pasting it into the target stack. This offers incredible possibilities for adding meaningful and exciting contextual clues into text.

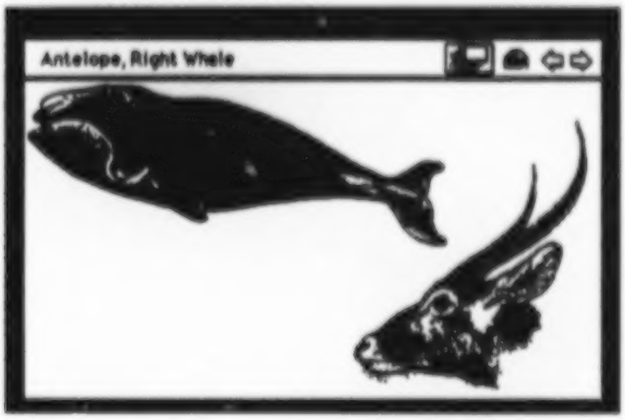


Figure 10.9: *The Animal Stack. This stack provides a scrapbook of animal pictures for use in other stacks.*

Picture adventure

Inigo Takes a Bath is a very visual stack; there is no text. This is a children's stack portraying a cat taking a bath. But because there is no text, it could be useful in literacy teaching at all levels to talk about sequencing. Although this may not sound too challenging, the stack makes use of good ideas which could easily be adapted to create materials to appeal more to adult learners.

Inigo Takes A Bath uses transparent buttons which, when clicked, show closeups of the objects they are placed over. Other transparent buttons create animation effects. These effects are simple card animation, flick-book style, but effective nonetheless in generating ideas and suggesting possibilities. One of the effects of this sort of stack is that the user has to make connections between what has been discovered, by exploring the buttons on a card. For example, clicking on one of the drawers, shown in **Figure 10.10**, reveals a neatly folded towel which must be fetched, once *Inigo* gets out of the bath.

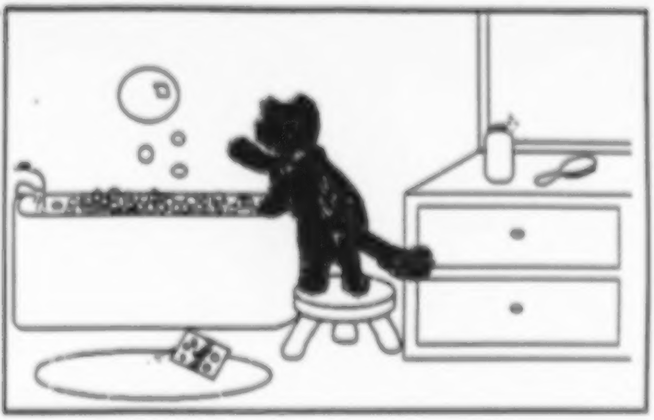


Figure 10.10: *Inigo Takes A Bath: Story telling without text.*

HyperCard with speech capabilities

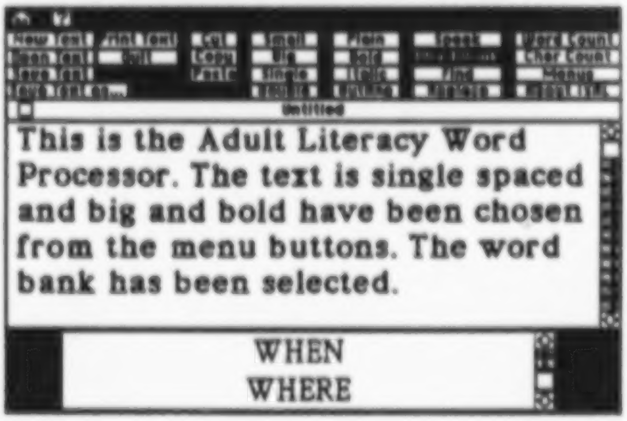
This section is divided into two parts. The first part deals with stacks that use synthesised speech, while the second deals with digitised speech stacks.

Stacks with synthesised speech

The Adult Literacy Word Processor

Developed at the the Institute for the Study of Adult Literacy (ISAL 1988), *The Adult Literacy Word Processor* makes use of speech synthesis. Using buttons instead of pulldown menus, it provides a word processor with the usual features as well as incorporating a considerable word bank for low literate adults. The program comes with *MacinTalk* and an *Exceptions File*. The *Exceptions File* works with *MacinTalk*, the speech synthesiser, to provide correct pronunciation of all words in the word bank.

The Adult Literacy Word Processor has significant advantages, for low literate adults, over other word processors. **Figure 10.11** shows the word processor screen with part of the word bank at the bottom of the screen.



New Text
Print Text
Cut
Small
Plain
Speak
Word Count
Open Text
Quit
Copy
Big
Bold
Char Count
Save Text
Paste
Single
Italic
Find
Menus
Save Text as...
Untitled

This is the Adult Literacy Word Processor. The text is single spaced and big and bold have been chosen from the menu buttons. The word bank has been selected.

WHEN
WHERE

Figure 10.11: *The Adult Literacy Word Processor. On this screen the word bank button has been clicked, revealing a 1000 word scrolling field.*

Because *The Adult Literacy Word Processor* uses speech synthesis, any text can be read by the computer. The user can get immediate feedback about what has been written. To hear some text, it must first be selected; the speak button is then clicked and the computer responds.

Speech is used extensively to help the user make best use of the functions available. Clicking first on the ? button, and then any button requiring help, results in an audio explanation of its function. This is certainly an encouraging feature for teacher and student, as it enables the user to work independently.

All functions are accessed by a bank of ever visible word buttons, not by pull down menus. This is perhaps a less confusing approach to selecting functions, for low literate users. Clicking on the *Bold* button will change all text to bold; the *Double* button will create double spacing between lines; the *Big* button will increase the size of text to 24 point, and so on. *Cut* and *Paste*, *Find* and *Replace*, and *Save* features are also present. This program also allows the user to hear how many words or characters have appeared in the text.

If the user is searching for a word to use, then clicking on the *Word Bank* button will produce a scrolling field which contains 1000 high-frequency and survival words. Click on any word and it will be spoken by the computer. Thus the user can make predictions about words and their spelling, do a search through the word bank, and get an immediate audio response. Being able to customise the word bank is certainly an improvement that could be made to this program. More advanced users may opt to use pull down menus instead of buttons. The *Menus* button allows them to do this.

One of the real limitations with HyperCard occurs when pages need to be printed. The whole window is usually printed when the text field is all that is required. Further, since text may be stored on a scrolling screen, it is not possible, without printing a portion at a time, to print a complete text in one piece. This word processor stack appears to have solved the problem in part; the printout produced is in normal text format; however, the size of the text is not that selected in the word processing stack. As this is a test version, the problem may well be solved by the time the stack is ready for general release.

The Adult Literacy Word Processor stack does equip the adult literacy learner with the tools to practise reading and writing skills in context and in an interactive way. There is a great deal more control of the word processing powers of this program, available to the adult literacy learner, through the use of sound.

Aritho

Aritho is a drill and practice adventure game which, again, uses *MacinTalk* speech synthesis to provide information for users. The information includes advice on directions: *You cannot go this way, try another way*, as well as notification of tasks that need to be performed. As this is a maths stack, the user, when confronted by *evil men and beasts*, must solve maths problems in order to search the various castle rooms and pathways to rescue a fair princess, aptly named Mathena (**Figure 10.12**).

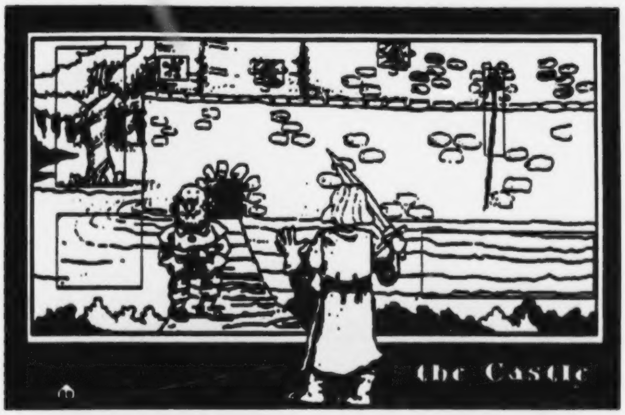


Figure 10.12: *Aritho demonstrates some adventure game possibilites. The rectangular buttons in this figure become invisible when in browse mode. These buttons may be repositioned anywhere on the picture.*

The artwork and card animation in the short demonstration stack reinforce the appeal of this type of drill and practice program. The transparent buttons, which allow the user to explore the castle, can be moved. The adventure may, therefore, be modified quite easily. The addition of speech gives an extra dimension to this program, and makes it accessible to a broader range of users.

Alphabet

Alphabet is a handwriting stack for beginners. It introduces the user, via synthesised speech (*MacinTalk*), to the steps involved in writing letters and numbers, and also the drawing of shapes.

There are three cards in this stack: *Alphabet, Number and Shape*. The *Alphabet* card (**Figure 10.13**), displays the letters of the alphabet, within square buttons, in two rows across the bottom of the screen. If a letter is clicked, the computer begins to describe the procedure for writing the selected letter as it is drawn in the middle of the screen. The animation gives a quite accurate idea of the way to go about making the shape and the speech works effectively to reinforce the concept.

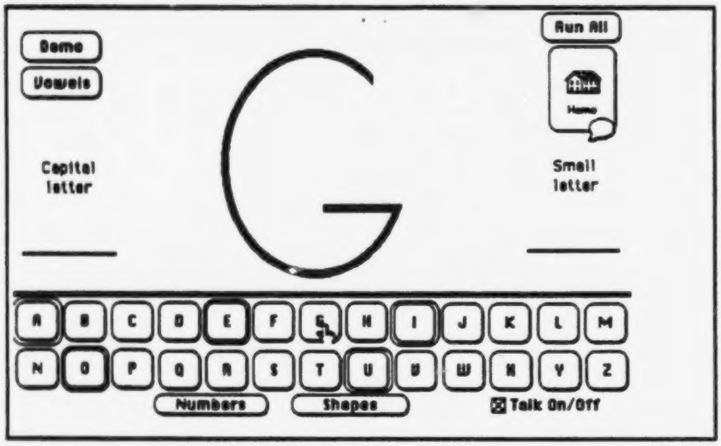


Figure 10.13: *Alphabet. Animated handwriting with synthesised speech directions are a feature of this stack.*

Digitised speech stacks

Alphabet for Adults

Alphabet for Adults, a phonics learning package from Drexel University, Philadelphia, is a drill and practice stack which uses digitised sound to support text, animation and scanned graphics. The user is invited, by a *human* voice, to click on a letter of the alphabet to start the lesson.

If, for example, the letter E is selected, a card appears with an upper case E in the top left corner, and the voice says *click E to start the lesson*. **Figure 10.14** shows this lesson. The audio directions in this stack are much clearer than synthesised speech directions. As the user progresses through the drill, by typing the letter E, a scanned picture appears. Once the user responds to the audio directions, *Type E to see the name of this picture*, the word associated with the picture will then appear and be spoken by the computer. Two pictures and their names are used per card and the names may be heard again by clicking on a speech icon which appears, along with a *Quit* and a directional button, after the two words have been introduced.

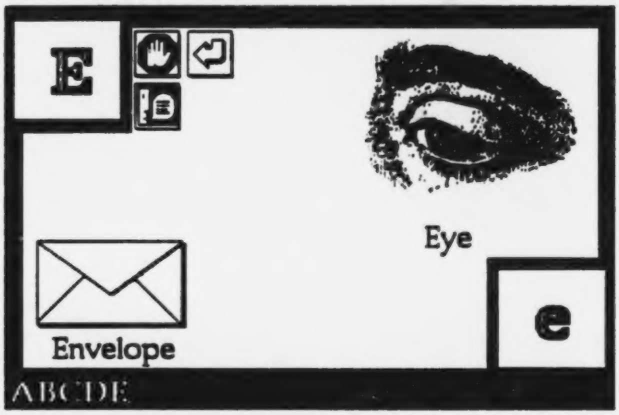


Figure 10.14: *Alphabet for Adults. Digitised speech and scanned graphics feature in this stack.*

At five or six letter intervals, two reinforcement activities are encountered. The first presents the user with words to type. These words use only letters that have already been introduced, as **Figure 10.15** illustrates. The computer reads each letter and then invites the user to *type these letters on the keyboard*. The second activity simply invites the user to *click on these letters to place them in order*, upon which the typed letters disappear from the centre of the screen and appear across the bottom. Feedback is given in a number of ways. The computer speaks to the user, a text screen displays the number of correct letters, and gaps appear across the bottom where incorrectly placed letters are removed, ready to be replaced correctly if the user chooses to do so.

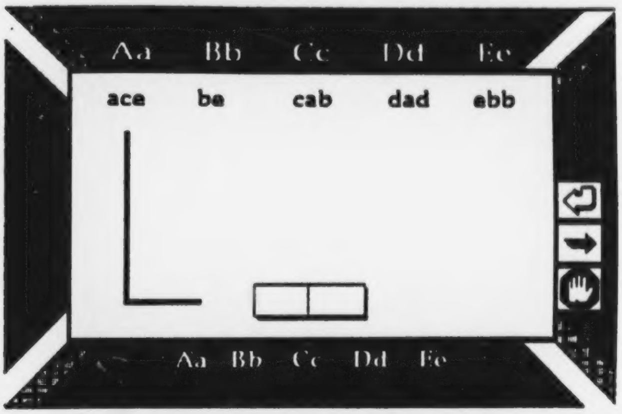


Figure 10.15: *Alphabet for Adults*. The letters of the word indicated are spoken by the computer and the user is then invited to type the word.

The digitised speech in *Alphabet for Adults* is effective and again, because of HyperCard's scripting capabilities, these messages can be created, cut and pasted, and manipulated in a very efficient way. The creators of this stack did not have to record every sentence spoken, each time it was spoken. Instead, recorded words and phrases were simply patched together in an object's script.

For example, recordings were made of the letters of the alphabet, and then of words and phrases like *click, type, to see the name of this picture,* and *to go to next lesson.* When an instruction on the E card is required, the script might look like this:

```
play "click"
play "e"
play "to see the name of this picture"
```

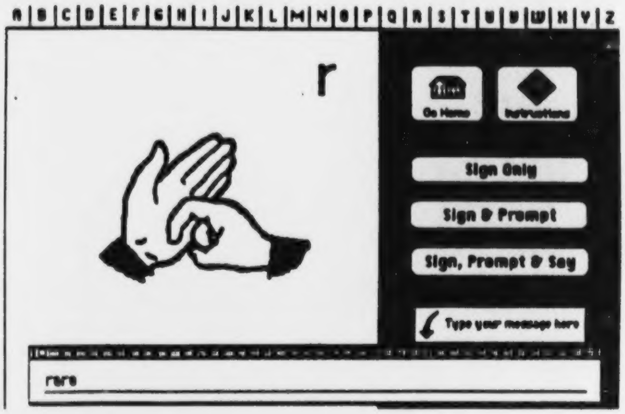
Because objects and their scripts can be copied easily, this set of instructions can be used for every letter of the alphabet by simply replacing the letter *e* in the script with the appropriate letter. This allows the user to use digitised sound, in a way that reduces the demands on computer memory.

FingerSpell

Another stack which makes use of digitised sound is *FingerSpell*. This stack teaches sign language by use of scanned images and speech. The images are scanned from a textbook, *A Basic Course in American Sign Language*. The user types a word into the message box at the bottom of the page and then decides on how the word will be presented, by selecting one of three buttons (**Figure 10.16**).

If the *Sign Only* button is clicked, the finger signs for that word are displayed, one letter at a time. A second button, *Sign & Prompt*, again displays the finger signs but also includes the letter each sign represents, at the top right of the screen. The *Sign Prompt & Say* button goes one step further and adds the digitised sound of each letter as it is signed.

Dr Charles Hart and John Hallett, responsible for the modified Australian version of *FingerSpell*, suggest that future versions may include a *FingerSpell dictionary* from which words are chosen to be signed.



rare

Figure 10.16: *FingerSpell. Scanned drawings and digitised speech are used to help teach sign language.*

The significant factor in *FingerSpell* is that the speech facility is only a part of the overall learning environment. It is a significant feature, but only if the user requires it. There is again, a choice, an added diversity in the delivery of instruction, inherent in the design of this and other HyperCard stacks.

Other software with speech

Tell a Story

Tell a Story is a shell program which allows the user to create text which the computer can read back. Making sense of the text can be enhanced by the aid of a glossary function, through which the story maker can provide word meanings or clues which are spoken by the computer at the request of the user. This program was developed within the School of Education at Flinders University.

Getting started

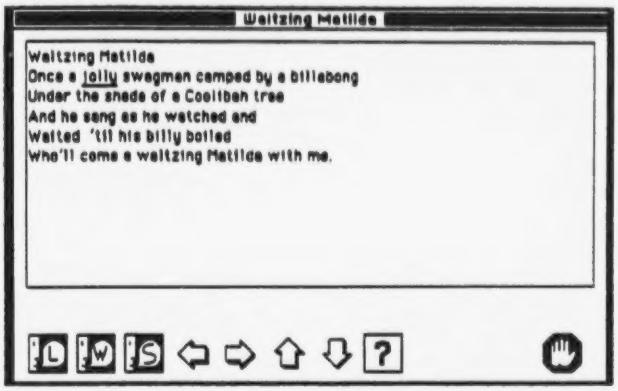
The *Tell a Story* program runs on any Macintosh computer and uses *MiniWriter*, a desk accessory word processor for entering text, and *MacinTalk* for speech synthesis. To use *Tell a Story*, text must be entered and saved via *Miniwriter*. Once saved, it can be loaded into *Make a Story*, the story creation part of *Tell a Story*. This program loads very quickly. The user is presented with a screen divided into two sections; the top two-thirds for text display and the bottom third for a glossary.

Make and Tell a Story

The uncluttered *Make a Story* screen has four menu options available. The *Format* menu allows text changes to be made to the whole text. These changes enable the selection of different fonts and font sizes (9- 24 point), a range of line spacings and margins, and reading options. The reading options determine whether the synthesiser, used in *Tell a Story*, will pronounce capitals or punctuation from the text.

The main task in *Make a Story* is for the user, the teacher, to decide which words in the text could usefully have meanings entered in the glossary to assist readers. The user decides on the meaning for a word and enters this meaning or explanation into the glossary by choosing *New entry* from the *Glossary* menu. Once this meaning has been entered, the word (or words) can be highlighted in the text. Any glossary entry can be edited and any words may have a glossary entry of their own.

The *File* menu allows the user to transfer the *Make a Story* file to *Tell a Story* for reading. When *Tell a Story* is loaded, the user is asked to select a file to load. Once loaded, the text is displayed as in *Make a Story*. However, the glossary box at the bottom of the screen is now replaced by a number of control buttons. The cursor changes to a thin line that underlines the first word in the text. **Figure 10.17** shows the *Tell a Story* screen.



Waltzing Matilda
Once a jolly swagman camped by a billabong
Under the shade of a Coolibah tree
And he sang as he watched and
Waited 'til his billy boiled
Who'll come a waltzing Matilda with me.

Figure 10.17: *Tell a Story. Letters,Words or a Sentence may be heard by clicking on the appropriate button. The ? only appears when a selected word has an associated glossary meaning. In the illustration, jolly has a glossary item associated with it.*

The user now has the tools to hear any letter, word, or sentence, by clicking on the cursor movement buttons to move to a word and then clicking on either the Letter, Word, or Sentence button. If the word has an associated glossary item, then a button with a ? appears. Clicking on ? shows the glossary box with the meaning in it, and this is read by the computer.

This program allows the user to think about word and language structure and, with the aid of speech synthesis, predict words and their meanings, and then get audio feedback about the accuracy of those predictions. The simple screen setup is also less confusing for low literate users. The main limitations of this program involve having to manoeuvre through three different programs to create and use text.

Pennsylvania State Adult Literacy Courseware

The Pennsylvania State Adult Literacy Courseware, a set of programs for adult beginning readers, was developed using a whole word approach to teaching 1000 high-fequency and functional words with the aid of the speech synthesiser.

The software consists of twenty one 5.25" disks, comprising six modules which are organised in the following way:

Module 1. Computer Usage
Module 2. 250 Basic and Survival words
Module 3. 440 Basic and Survival words
Module 4. Application forms
Module 5. Spelling Patterns
Module 6. Word Processor

Supporting the modules are various module tests and games disks, as well as a *File Editor* and *Student Data* disks.

The documentation is excellent. The User's Manual clearly outlines the history, field testing, and learning theory underpinning the programs. Each module is precisely explained, including loading and disk management instructions. Because of the size of the package, this is essential information. There are also complete lists of all words used in the courseware. Further, this manual explains the required hardware setup very effectively.

Hardware requirements

The Pennsylvania State Adult Literacy Courseware requires the following items of hardware at the ALU:

- An Apple //e, twin disk drives and colour monitor.
- An Apple SuperSerial card which must be fitted into slot 1 in the computer. The Dip Switches and the Jumper Block on this card must be set correctly.
- An Echo GP Speech Synthesiser (described in Chapter 4) which must be plugged into the Super Serial card.
- An Apple ImageWriter // printer, which must be run out of the SuperSerial card slot by disconnecting the Echo system. This is an optional requirement.

Using the courseware

The first module acquaints the user with certain relevant features of the computer keyboard and the commands common to all modules. In particular, the user is introduced to commands for accessing *Quit*, *Help* and *Speech* functions. This is important as very early on it is established that the user has control over aspects of this program. All of this information is animated and delivered with speech synthesis; it is a talking tutorial. The speech is not as clear and fluent as one would like but it does allow the low literate user to work independently through the program.

Audio contexts

Module 2 deals with *picturable words*; that is words introduced with a colour graphic. The lessons are divided into small manageable wordsets of ten words grouped into twenty-five themes such as Food, Travel, Money, Roadsigns. Before a student works on a lesson, a pretest can be administered. Mastery level is set at 90 per cent, and performance can be recorded and analysed directly onto a *student data disk*, specifically created for the module. Similarly, posttests can also be administered.

The style of the lessons is to deal with whole words. Exercises are presented in a variety of formats, the synthesised speech providing instructional directions for the user. Of course, if the user is unsure of what to do, it is easy to use the speech command to repeat an instruction.

Some examples

Some examples of the types of exercises follow. On one screen, for example, a rectangular box at the top displays the words in the current wordset. Below it is a sentence in large print, lower case:

The   on Sue's house is red.

The computer tells the user the purpose of the two sections on the screen, reads the complete sentence, and prompts the user to type the word *roof*. The user therefore gets to see and hear the word in context, and may locate it in the box if unsure of the spelling.

Another task displays two or three words and a picture of one of them. The computer tells the user: *You will hear a word, type the number of the word you hear.*

Reinforcing learning

Learning is also supported by a further disk of drill and practice games. These include games like *Wordhunt, Wordmatch, Wordrace, Hidden Word.* The difference with this program is that they are effectively supported with speech to reinforce the understanding of the task for the learner. For example, *Wordmatch* only presents four words in numbered boxes. The computer instructs the user to *Choose the word that you hear,* and then proceeds to recite a sentence containing one of the words. An important connection is being made between the spoken word and the written word.

Creating new materials

Module 3 follows the same format as the above with non-picturable words. One of the great strengths of this courseware is that it provides a set of creation programs to generate tests, lessons and games, for six teacher-created wordsets. If more wordsets need to be created, another set of the necessary courseware must be copied. Thus the teacher can adapt the materials to suit the user, and monitor the user's progress effectively too.

Functional literacy

Module 4 provides a selection of 140 basic and survival words, introduced in a similar manner to the previous module lessons. However, instead of using tests and games to support the learning, there is a selection of application forms which make use of the wordsets. Users can fill in the forms with their own personal data, one section at a time. **Figure 10.18** illustrates some of the possible choices.

APPLICATION FORMS
1) Introduction
2) Name, Social Security Number
3) Date, Birthdate, Sex
4) Address, Telephone Number
5) Marital Status, Citizenship
6) Educational Background

Figure 10.18 *Application Forms*

This module has direct application to the adult literacy learner's real life needs. The use of sound and the structure of the program allow the learner to work through these exercises with greater independence.

Word building

Module 5 follows an analytical phonics approach, using word families to build words. Designed to teach word recognition using common spelling patterns, this is the only decoding skill taught in the program. For example, the following sentence is read by the computer.

John likes to $\boxed{\text{bake}}$ pies.

The b dissappears from bake and the computer asks the user to *type the letter* b. If the response is incorrect, then words from the same family are displayed,

1. cake 2. fake 3. bake

and the user is asked to *look for the word* bake *and type 1, 2, or 3*. As with the other modules, there are many opportunities to practise the words.

Word processing

In keeping with the idea of applying words to a variety of situations, a word processing program completes the courseware. There are two different forms of the word processsor: one for the student and one for the teacher. They function identically. The student version has a word bank containing all the target words taught in the courseware. Thus a student may work on a wordset, then apply that learning in a writing situation and check spelling from the word bank.

A speech-driven tutorial help lesson introduces the user to the simple features and control functions of this program. The screen in this tutorial is very carefully devised to present graphics only. When text is entered, the user can apply the usual speech command to listen to whatever has been written starting from the current line the cursor is on. The words in the word bank cannot be spoken by the computer.

The teacher's version provides a customising feature. It is possible, using the teacher's version, to create a word bank uniquely appropriate for any users. Words that a learner requires for work, for example, may be added to a word bank for referral to as the need arises.

Disk management

One of the problems with the *Pennsylvania State Adult Literacy Courseware* is not in the approach or content, but in the quantity of disks that need to be managed. The disks are double sided with various combinations required to run each module, log each student's data, and access graphics and game files. It is quite confusing and difficult to manage even for the seasoned computer user. To add further to the mountain of disks is the need to make seven *student data disks* for each student, if the student record keeping feature is to be used properly! This set of programs must be run from a hard disk if a broad range of teachers are going to be able to manage the software. Further, the need to add a card into the computer and reconnect peripherals adds to the management problems.

Adult Literacy Word Quest

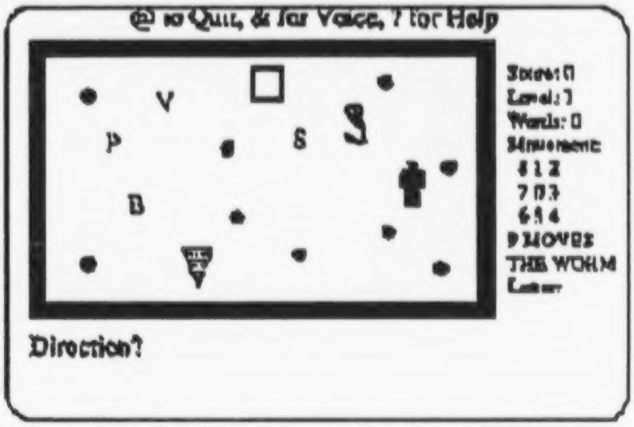
The *Adult Literacy Word Quest* is a drill and practice adventure game for low literate adults. It has the same hardware requirements as the *Pennsylvania State Courseware*. The software is available on both 3.5" and 5.25" (two disks) formats.

Using Word Quest

The *Adult Literacy Word Quest* User's Manual which accompanies the program outlines the object of the game:

> *The basic goal of the game is simple. You (the player) must descend to the bottom of the Dungeon of Letters, retrieve the lost Dictionary of Knowledge, and bring it back to the surface. The dungeon is five levels deep. The Dictionary is, of course, located on the fifth level. During your journey, you will encounter letters and the dreaded book worm. These are the guardians of the Dictionary. Encountering a letter forces you to type a word that begins with that letter. The word is first spoken, then read in a sentence. Typing the word correctly will increase your score. Wrong answers will detract from your score. The other obstacle is the Bookworm. If the Bookworm catches you, you're dead. Avoid it at all costs.*

The main screen, shown in **Figure 10.19**, displays a rectangular playing area with letters and the various game characters placed randomly within this space. To the right of this area is information about score, game level, number of words encountered and player movement keys. When a player moves, the dictionary guardians respond by moving around.



Direction?

Figure 10.19: *Adult Literacy Word Quest. Animation and synthetic speech enhance this program.*

The *Adult Literacy Word Quest* uses synthesised speech to give a word in context and then to instruct the user to type in the word. As with the *Pennsylvania State Courseware*, the same on-screen cues for *Quit, Voice* and *Help* are always available for the user to control the situation. There is a time limit on responses, and feedback includes speech and updating of the player's score. Responses must be in lower case; correct spelling in upper case will result in an error. The *Help* function reads to the player, directions on any of the game elements chosen.

Word Quest allows the user to practise words and to think and plan strategies. The screen characters are a little small and the screen definition, even on a colour monitor as recommended, could be better. Similarly, the synthesised speech, without the added benefit of seeing the sentences that are spoken, is sometimes quite hard to decipher.

One of the excellent features of this program is the edit facility which allows new words and sentences to be entered into the game. This feature is accessible via a hidden menu which offers a *Create/Edit Word File* option. A thousand words, with fourteen character maximum length, can be added and edited using simple edit keys. For each word, a sentence can be typed, phonetically, for the synthesiser to speak it in context. Maximum sentence length is forty characters.

Word Quest shows the potential of software with speech in providing effective customised learning for low literate students. This program could operate with different word lists for different students. Because of the random arrangement of the game objects, no two games are the same. *Word Quest* challenges the user at a range of learning levels.

Talking Keys

Talking Keys is a shareware desk accessory program for the Macintosh computer. It allows the user to hear letters and words as they are typed, by way of *MacinTalk*. *Talking Keys* can be loaded from the finder and used by itself, or it can be used in a word processing program.

Once the desk accessory has been called up, it will appear as an option on the word processing program menubar. From the *Talking Keys* menu, the user is able to select a number of options. These include allowing letters or words to be spoken, as they are typed, or only when selected. Other options allow the speed of the synthesiser voice to be adjusted. There is even a selection which allows text to be spoken as it comes to the terminal, via modem!

Preview

The chief characteristic of much of the software reviewed in this chapter, particularly that referred to as *new generation* software, has been the incorporation of speech. No longer do we have just silent software. The two types of speech, synthetic and digitised, now feature in many of the programs that have application for adults in literacy classes. The next chapter describes *HyperStory*, and focuses particularly on the use of digitised speech to enhance the learning environment.

11 CASE STUDY:

HyperStory – An Adult Literacy Learning Application

HyperStory was developed as part of this evaluation of the use of technology to gauge the possibilities for using HyperCard in adult literacy learning. In particluar, the use of digitised speech was explored. The purpose was to provide ideas for teachers to copy, modify and apply in their own stacks. The HyperStory stack may also be used with students, although the language on some cards is perhaps more suited to demonstrating ideas to teachers. This Chapter describes in some detail the features of HyperStory and how it was developed. Also described is *Kym's Stack*, a student-developed stack, which makes use of some of the ideas in HyperStory.

Developing HyperStory

HyperStory, a HyperCard stack, was developed at Flinders University, to demonstrate how speech, graphics and text can be used by teachers to provide creative, customised software for adult literacy use. The development of the stack, fuelled by the enthusiasm in the literature surrounding HyperCard, began with a confidence that this authoring tool should be easy to learn! The equipment needed and the procedures adopted in developing the stack are detailed below.

Getting started

A Macintosh SE with a 20 megabyte hard disk and an 800K internal drive was used. HyperCard is available as a three disk package. The disks are:

- *HyperCard Stacks* containing HyperCard, the Home stack and various other utility stacks.

- *HyperCard Help* containing Help, Help Index and Help Sample stacks.

- *HyperCard Ideas* containing Art, Stack, Button, and Card Ideas.These stacks were installed on the hard disk and all initial authoring was done on a floppy disk.

Intitial stacks were very simple, cutting and pasting pictures from the art ideas stacks, making buttons to link several cards, creating several text fields and even pop-up fields. One of the most important discoveries at this stage was that the Help stacks were an excellent resource for learning HyperCard.

It became evident that here was a tool for doing powerful things very quickly – an empowering experience.

Other stacks

The next stage involved examining other HyperCard Stacks. This proved to be the catalyst for the development of something more substantial: the HyperStory stack. Of particular interest was the use of sound buttons and visual effects in many of the stacks.

All stacks looked interesting at this stage. However, one stack in particular was inspirational, because of its highly organised design, scanned graphics, digitised sound and effective use of pop-up text fields. The stack was the *The Surface Anatomy of Birds* stack (version 1.2d) produced at Yale University (**Figure 11.1**), and available from the Berkeley MacIntosh Users Group. **Figure 11.2** shows the stack's index card, an important organisational feature of complex multibranching programs.

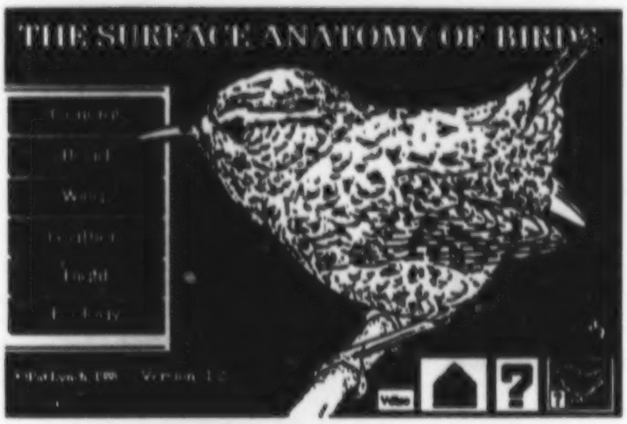

THE SURFACE ANATOMY OF BIRDS

Figure 11.1: *The Surface Anatomy of Birds is an excellent example of a well designed HyperCard stack.*

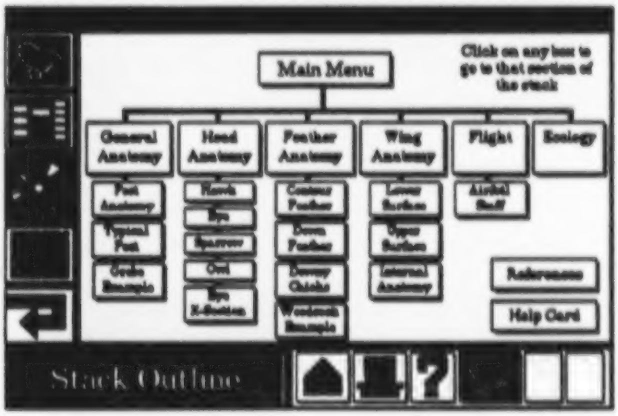

Main Menu
Click on any box to go to that section of the stack
General Anatomy
Head Anatomy
Feather Anatomy
Wing Anatomy
Flight
Ecology
Foot Anatomy
Typical Foot
Eye
Sparrow
Owl
Eye X-Section
Contour Feather
Down Feather
Downy Chicks
Woodcock Example
Lower Surface
Upper Surface
Internal Anatomy
References
Help Card
Stack Outline

Figure 11.2: *The Surface Anatomy of Birds index card allows the user to explore any content in this stack.*

Learning HyperTalk

Examining the style of the *The Surface Anatomy of Birds* stack led to an investigation of HyperCard's scripting language, HyperTalk. Numerous books explain the array of simple English language commands available. However, the best way to learn HyperTalk proved to be by examining the scripts of other stacks, cards, backgrounds, fields and buttons. Whenever further details were needed, or commands needed to be clarified, texts by Shafer (1988) and Poole (1988) were referred to.

HyperStory begins to take shape

HyperStory began to take shape, driven by the power of HyperTalk scripting. The idea was to develop literacy materials demonstrating that, with HyperCard, software could easily be produced, doing as much as other available software.

HyperStory began as a four-card story. The content was chosen to reflect an adult experience – a couple going on a bushwalk. It was decided to include a variety of teaching ideas so that literacy teachers and tutors could copy any of the objects and use them. The key ideas included in the stack were:

- Using HyperCard as a talking word processor and a text manipulator
- Contextual reading clues
- Graphics and animation clues
- A speech glossary
- Digitised speech clues
- Content branching
- Cloze exercises
- Exercises based on cohesive ties
- Visual word patterning
- Multilingual texts

Adding speech

HyperStory makes use of both synthesised and digitised speech. The inclusion of these capabilities required certain software and hardware, and an understanding of the use of external commands (XCMD) for HyperCard.

Synthesised speech

Speech synthesis was provided by *MacInTalk* which was placed in the Systems Folder on the hard disk. HyperTalk ordinarily does not have a speech command and so this had to be added to the HyperStory stack as an external command. External commands effectively extend the HyperTalk language, as Shafer (1988) explains:

> An XCMD is a command added to HyperTalk's vocabulary by a program written outside HyperCard, typically in C or Pascal but also in assembly language and incorporated or *glued* into HyperCard.

HyperCard allows the user access to scripts or to copy, cut and paste objects, complete with their scripts. Thus it was possible to copy speech buttons from shareware stacks. They were not, however, able to produce sound until the appropriate XCMD was *glued* into Hyperstory. Glueing the XCMD into HyperStory required the use of a copying program.

ResCopy, a Macintosh developer's utility, was used to transfer resources (such as XCMDs), from one HyperCard stack to another. Thus the XCMDs *TurnSpeechOn*, *TurnSpeechOff* and *Say* were added to HyperStory. With these XCMDs, synthetic speech became part of the HyperStory stack enabling text, in any HyperStory field, to be spoken by the computer.

Digitised speech

MacRecorder was used to produce digitised speech clues in HyperStory. MacRecorder, a sound recording package for the Macintosh, consists of both software and hardware.

Two software disks contain three programs. One is *HyperSound*, a HyperCard stack, which allows sounds to be saved and pasted as buttons in any stack (**Figure 11.3**). Another is *SoundEdit*, software which allows sounds to be cut, pasted and modified and then added as resources to HyperCard stacks or other programs. The third program, *MacRecorder demonstration*, is a HyperCard stack demonstrating the use of the sound system.

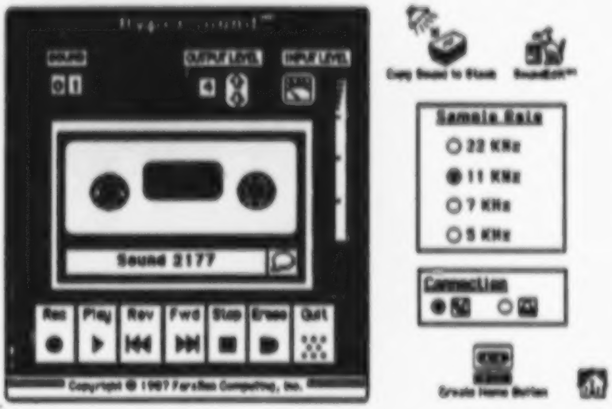

HyperSound™
Sound
Output Level
Input Level
Sound 2177
Rec
Play
Rev
Fwd
Stop
Erase
Quit
Copyright © 1987 Farallon Computing, Inc.
Copy Sound to Stack
SoundEdit™
Sample Rate
○ 22 KHz
● 11 KHz
○ 7 KHz
○ 5 KHz
Connection
Create Home Button

Figure 11.3: *HyperSound. This card operates like a normal tape recorder by simply pressing the required button.*

The hardware item required is the MacRecorder sound digitiser, the sound input device featuring a built in microphone, microphone in and line in jacks, and an input level control knob. Also supplied is an audio cable for direct line-in recording from most sound equipment. These hardware and software items comprising *MacRecorder* are relatively inexpensive (less than $300).

Initial work with *MacRecorder* made use of HyperSound, which allowed effortless recording and then copying of recorded sound, as a button placed directly into a stack. It became evident quite quickly that, because of the huge memory capacity needed for digitised sound, there was a need to be able to edit and modify sounds more accurately.

SoundEdit (**Figure 11.4**) proved a more flexible piece of software. Sounds could be recorded, any unwanted portions removed and any special effects added (e.g. echo). The procedure for using the sound in a stack was not as simple as for HyperSound. However, the increased flexibility more than compensated for this loss of convenience.

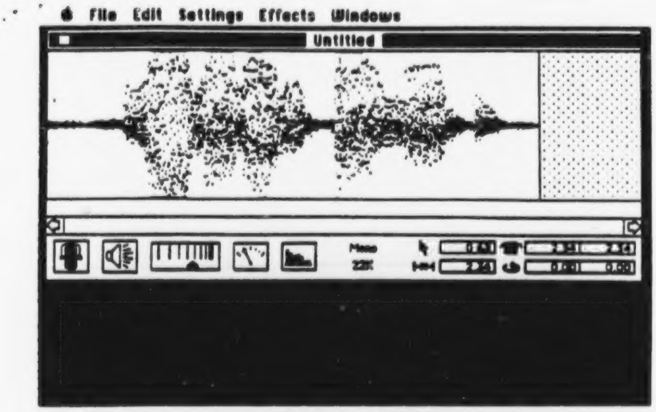


Figure 11.4: *SoundEdit. This program allows the user to record and modify sounds for use in HyperCard and other programs.*

Transferring speech

To record a sound using SoundEdit, the following occurred:

1. The *MacRecorder* was plugged into the Modem port at the back of the computer.

2. *SoundEdit* was loaded and the recording sample rate was adjusted to 11K (11,000 samples per second). The basic sampling rate for MacRecorder is 22K, the decision to downsample was a trade off between sound quality and computer memory. At 11K there is some high frequency loss of quality but the recorded sound uses half the memory; 11 Kilobytes per second of sound compared with 22K.

3. Several attempts at a word were recorded at the same time and the best one was kept; the others were cut in the usual Macintosh way. Any effects could be added at this stage.

4. The sound (word, phrase or music) was saved as a resource by opening the HyperStory file from the file selection dialog box.

5. This sound was now able to be used in HyperStory whenever it was included in an object's script. Therefore a button to play a recorded sound, such as *Welcome to HyperStory*, had a script which included the line: *Play "Welcome to HyperStory"*.

In this way, the glossary of digitised words used in HyperStory was built up. Very soon the size of the stack grew. In fact, HyperStory barely fits on an 800K disk, three-quarters of this used by the digitised sound resources. The need to work from hard disk became evident. HyperCard creates free space in the stack as you work. This free space needs to be removed regularly in order to keep the stack size at a minimum. The process is called compacting the stack and it requires stack size disk space to operate. Thus using digitised sound, a stack can quickly become too big to be compacted from a floppy disk. The procedure followed was to work from the hard disk, compact the stack and save it to back-up floppies.

Scanning pictures

In order to customise *HyperStory* further, images were scanned and added to the stack. Scanning is a process where images are digitised and stored on disk for cutting and pasting into programs. Scanning images required an Apple Scanner: hardware that digitises images, and HyperScan, software that enables images to be scanned, modified, and added as cards to any specified stack (**Figure 11.5**). The HyperScan software only allows a 72 dots per square inch image to be produced, compared with up to 300 dots per inch using AppleScan software. However, the convenience of moving many images easily from the HyperScan stack into any HyperCard stack, makes up for this loss of quality.

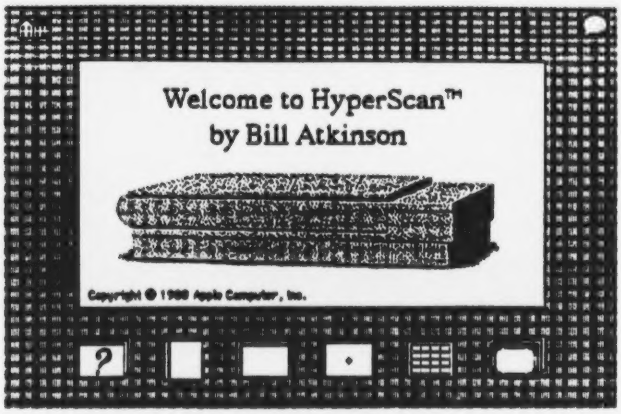


Figure 11.5: *HyperScan allows the user to scan quality images and save these as cards in any HyperCard stack.*

HyperStore

The following procedures were used for scanning images into HyperStory.

1. Create a HyperCard stack to store images. This stack was called *HyperStore* and it was simply one card with the title to identify it.
2. Gather images that adults literacy students will find interesting and usable. The images were selected with a range of print qualities.
3. Turn on the scanner, turn on the computer, load HyperScan, and follow the simple preview and scanning procedures.
4. Use HyperScan's *MoveCards* command to transfer the scanned images to HyperStore.
5. Copy and paste any images from *HyperStore* into *HyperStory*.

Organisational refinements

After examining many HyperCard stacks, several organisational features were included in HyperStory. An index card was created to show the main cards in the stack. In addition, a means of finding out where one is in the stack, was included. Help buttons and directional buttons provide easy access to cards and to speech-assisted directions on how to use many cards. Reset scripts allow user-alterable cards to revert to their original status for the next user. Links to other stacks, such as Art Ideas, HyperStore and HyperSound, were included to provide easy access to creative tools.

Exploring HyperStory

HyperStory (**Figure 11.6**), opens with an animated sequence which takes the user to an Index card (**Figure 11.7**). This card is central to moving around in HyperStory. It offers the user a way of moving to any card simply by clicking on the card's name. A further feature of this card is a means of knowing where one is, relative to other cards in the stack. At the bottom of the Index Card are a number of background buttons, buttons which are common to many cards the user will encounter in this stack. These buttons provide a number of options for the user. However, all of these buttons do not appear on every card.

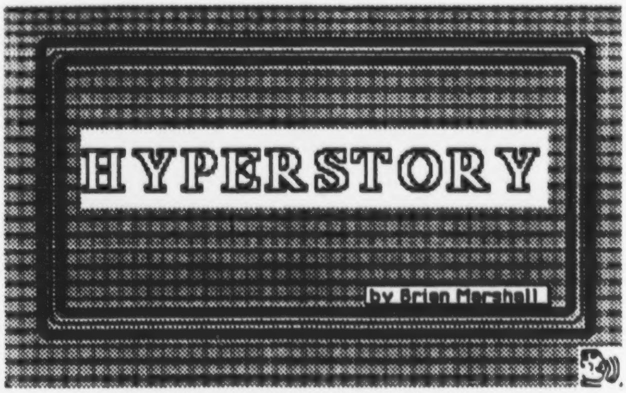

HYPERSTORY
by Brian Marshall

***Figure 11.6**: HyperStory's title card*

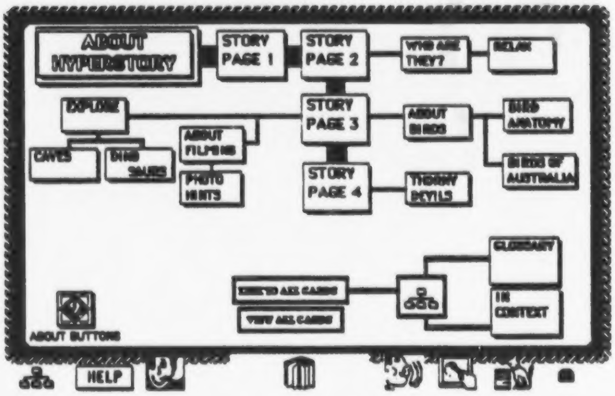

ABOUT HYPERSTORY
STORY PAGE 1
STORY PAGE 2
WHO ARE THEY?
RELAX
EXPLORE
STORY PAGE 3
ABOUT BIRDS
BIRD ANATOMY
CAVES
DINO SAURS
ABOUT FILMING
PHOTO HINTS
BIRDS OF AUSTRALIA
STORY PAGE 4
THORNY DEVILS
GLOSSARY
VIEW ALL CARDS
IN CONTEXT
ABOUT BUTTONS
HELP

Figure 11.7: *The IndexCard, linked to all cards, provides easy access to cards.*

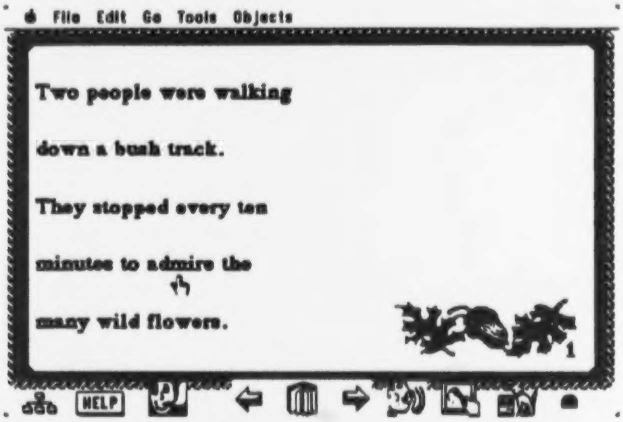
By clicking on the Index button at the bottom left of the screen, a user will return to the Index Card, and the name of the last card visited will flash within its box on the Index Card. The Help button, next to the Index button, provides information on specific tasks or features.

Alongside the Help button is the Speech button. This button allows the user to hear, via MacinTalk, any text selected from the card. Moving from card to card may also be achieved by clicking on the Directional buttons. The arrows take the user either forward to the next card or back to the previous card in the stack. The Book button allows the user to go back to the card which was last visited. The Hidden Speech button, to the right of the book, only appears on cards where there are hidden speech buttons within the text.

As HyperStory is a working stack, the two buttons to the right of the Hidden Speech button allow the user to access other stacks. The Graphics button takes the user to Art Ideas stacks. The MacRecorder button allows the user to access HyperSound for easy installation of digitised sound buttons. Finally, the Home button appears on every card and allows the user to exit the stack at any time.

Speech and graphics

HyperStory uses a four-card story to show teachers the diverse capabilities of HyperCard. **Figure 11.8** illustrates Story Page 1 as the user first meets it. Any text may be spoken, in synthesised speech, by the user selecting it and clicking the Speech button. Story Page 1 demonstrates a range of reading clues. For example, if a reader could not read the first word, *Two*, a clue is available to help. Clicking on *Two* reveals a small picture of two people; perhaps just enough of a clue for a low literate user to make a prediction, to take a risk. Several words on this card have digitised speech clues. Clicking on *were* or *every*, for example, will result in those words being spoken, in a human voice. Animated feet are used to give a different type of clue for the word *walking*. There was nothing very complex about creating this animation. Buttons with four different feet icons were copied from another HyperCard stack, and scripted to successively appear and disappear. **Figure 11.9** shows some of the clues which are normally hidden on this card.



Two people were walking

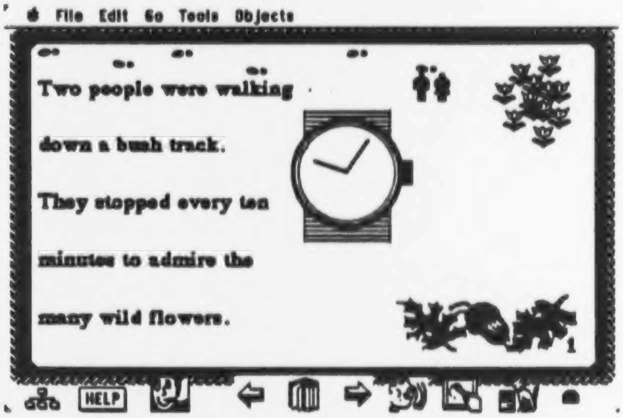
down a bush track.

They stopped every ten

minutes to admire the

many wild flowers.

Figure 11.8: *Story Page 1. Transparent buttons are placed over many of the words in the text field.*



Two people were walking

down a bush track.

They stopped every ten

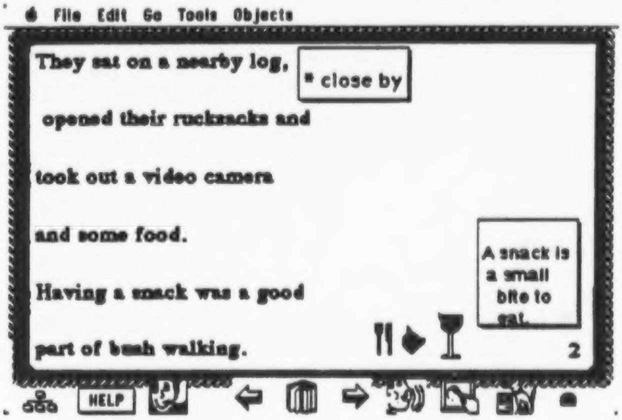
minutes to admire the

many wild flowers.

Figure 11.9: *Story Page 1. Picture clues are scripted to appear for a second or two and then disappear.*

Pop up text

Story Page 2 uses different clues. In **Figure 11.10**, various clues have been revealed. There are text and picture clues for several words on the card. Other words are again associated with digitised speech; however, this card goes one step further and also provides scanned pictures with these audio clues. For example, when *video camera* is clicked, the words are spoken and a picture of someone using a video camera appears (**Figure 11.11**).



They sat on a nearby log,

opened their rucksacks and

took out a video camera

and some food.

Having a snack was a good

part of bush walking.

* close by

A snack is a small bite to eat.

Figure 11.10: *Story Page 2. Hidden textual clues are designed to disappear when clicked on.*

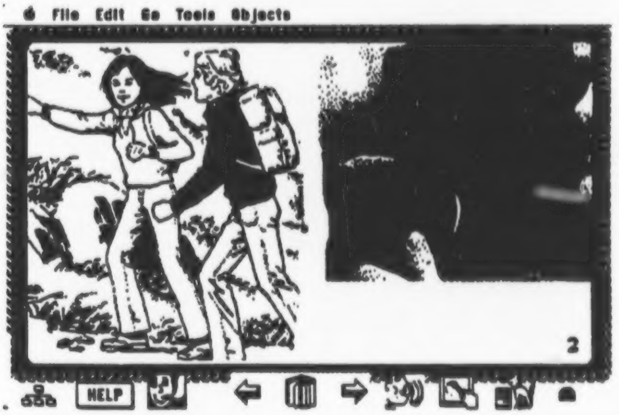
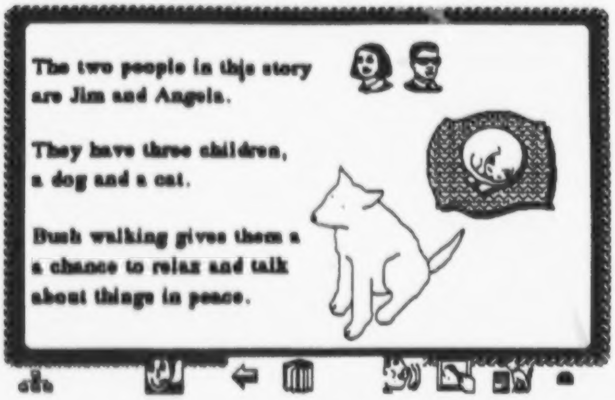


Figure 11.11: *Story Page 2. A card picture appears, contingent with digitised speech clues.*

Branching

Story Page 2 also allows the user to branch off and explore an aspect of the story not covered in the main text. By clicking on *They*, the user is taken to a profile of the characters, as seen in **Figure 11.12**.

Further branching occurs from the *Who are They?* card. By clicking on the word *relax*, the *Relax* card (**Figure 11.13**) appears. The *Relax* card uses one text field to display text associated with any of the pictures on the screen. The user may click on the ship, for example, and hear the word *ship* followed by the appropriate text appearing.

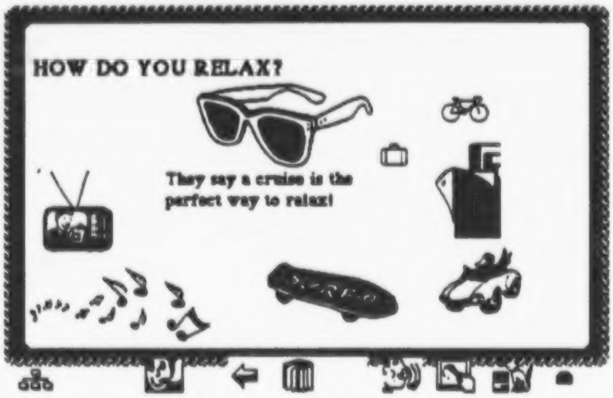


The two people in this story
are Jim and Angela.

They have three children,
a dog and a cat.

Bush walking gives them a
a chance to relax and talk
about things in peace.

Figure 11.12: *Who are They? Information on these characters, not included in the main text, appears on this card.*



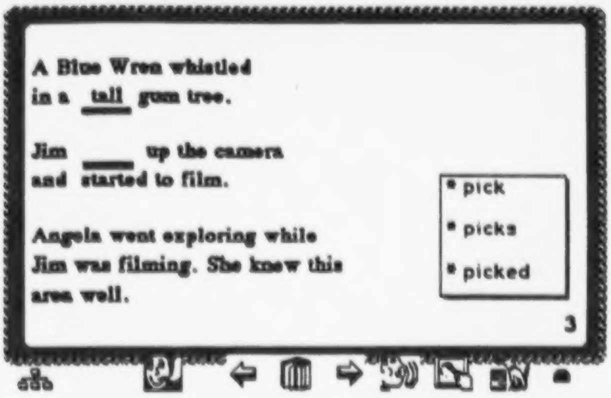
HOW DO YOU RELAX?

They say a cruise is the
perfect way to relax!

Figure 11.13: *The Relax card. Each picture is cover by a transparent button which puts text relevant to the picture into the central field.*

Cloze exercises

Story Page 3 provides cloze exercises with word alternatives appearing from hidden text fields (**Figure 11.14**). The alternatives are supported by speech buttons. When the correct word is selected, it appears to be replaced in the text. The text is not actually removed and replaced: it is merely covered by an opaque button which is subsequently hidden when the correct word is selected. Using the *Speech* button, the whole text can be heard, including the hidden word, before the gap is filled.



A Blue Wren whistled
in a tall gum tree.

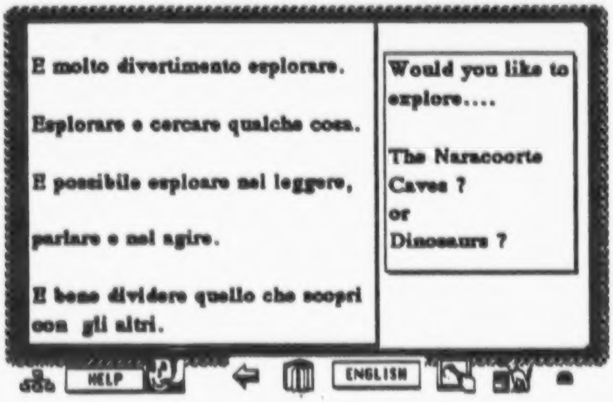
Jim ____ up the camera
and started to film.

Angela went exploring while
Jim was filming. She knew this
area well.

Figure 11.14: *Story Page 3. Any text can be made into a cloze exercise by covering words with opaque buttons.*

Multilingual texts

From the word *exploring* on Story Page 3, the *Exploring* card can be accessed. This card (**Figure 11.15**), provides text in English or Italian at the click of a button. Further, by providing links with other HyperCard stacks, this card demonstratres the information management and database access possibilities of HyperCard.



E molto divertimento esplorare.

Esplorare e cercare qualche cosa.

E possibile esploare nel leggere,

parlare e nel agire.

E bene dividere quello che scopri
con gli altri.

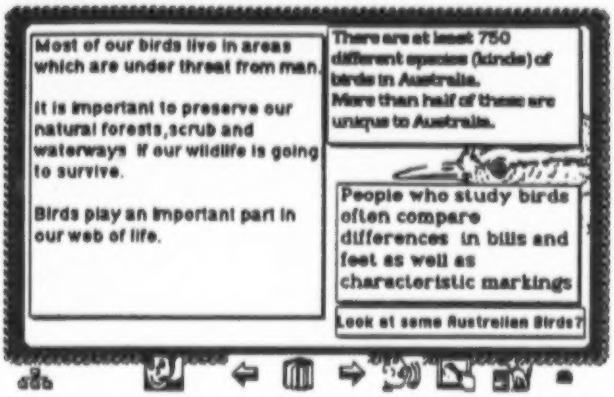
Would you like to
explore....

The Naracoorte
Caves ?
or
Dinosaurs ?

Figure 11.15: *Exploring. Italian text has been chosen which may be translated by clicking English.*

By clicking *Blue Wren*, the user may explore another aspect of the text of Story Page 3. The user is shown the *About Birds* card which provides general information on birds, with specific explanations in pop up text fields (**Figure 11.16**). This is a content oriented card.

Birds of Australia, a decoding card, allows the user to hear a bird name in synthesised speech (**Figure 11.17**). Further, by clicking on *Magpie*, the word will be spelled out, letter by letter. Each letter of *Emu* may be heard separately and the whole word may be heard by clicking on the picture. Clicking on the *Swan* and *Magpie* pictures, takes the user to larger pictures scanned from the same illustrations.



Most of our birds live in areas which are under threat from man.

It is important to preserve our natural forests,scrub and waterways if our wildlife is going to survive.

Birds play an important part in our web of life.

There are at least 750 different species (kinds) of birds in Australia.
More than half of these are unique to Australia.

People who study birds often compare differences in bills and feet as well as characteristic markings

Figure 11.16: *About Birds. The three information fields have been called up by clicking on specific words in the text. Look at some Australian Birds? is a button which accesses a Birds of Australia card.*

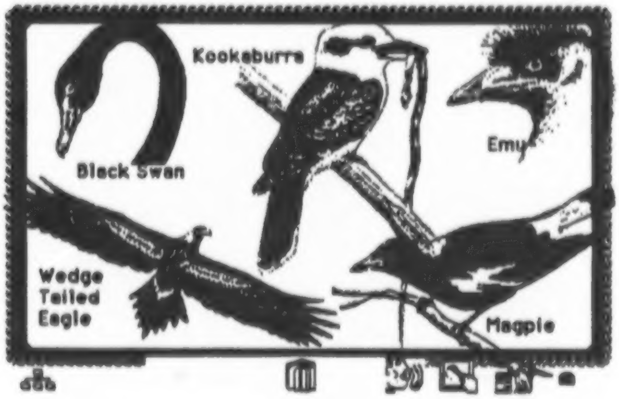


Figure 11.17: *Birds of Australia. Hidden speech buttons provide decoding practice. All pictures were scanned into the stack.*

Visual patterning

From the *About Filming* card, access may be gained to two other types of exercises. The first is a visual patterning exercise, where a word from *About Filming* may be recognised by its shape (**Figure 11.18**). The user may click on one of three words, to solve the task. Alternatively, by clicking on one of the boxes, a letter beneath may be revealed. The second type of exercise deals with cohesion.

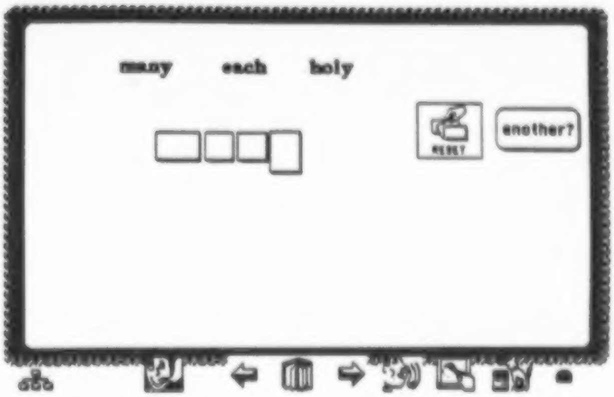
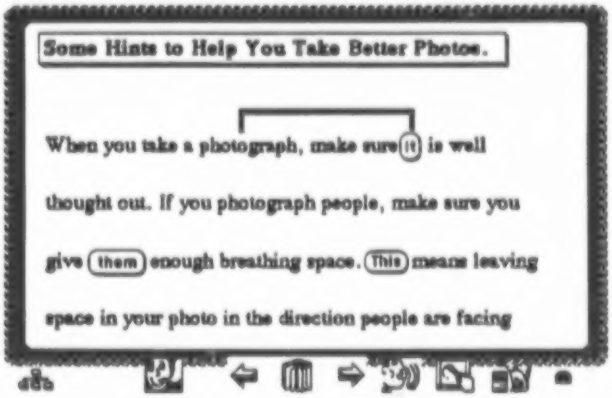


Figure 11.18: *This card provides decoding practice for words from the About Filming card.*

Cohesion

The *Photo Hints* card focuses on cohesion. Cohesion refers to the way phrases and sentences within a passage are connected or tied together to create text. **Figure 11.19** shows an example of the task on *Photo Hints*. By clicking *it*, a highlighted word, the user is asked to click on the word *it* refers to. *You're absolutley right* is the computer's reply if *photograph* is clicked. If the user clicks on any other word, a visual tie is shown briefly with another audio clue.



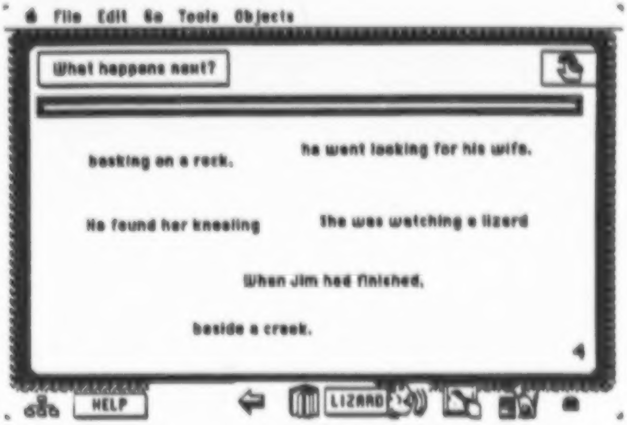
Some Hints to Help You Take Better Photos.

When you take a photograph, make sure it is well thought out. If you photograph people, make sure you give them enough breathing space. This means leaving space in your photo in the direction people are facing

Figure 11.19: *Photo Hints. The visual tie showing that 'it' refers to 'photograph', is highlighted briefly and is supported by an audio message.*

Rearranging text

Story Page 4 allows the user to move text around on the screen and is another activity based on the concept of cohesion (see **Figure 11.20**). The text is not contained in a field but on buttons. These buttons are digitised speech buttons, which may be clicked on individually or may be heard one at a time in their correct sequence. The buttons appear on the card in a jumbled arrangement and the user may first hear the correct order by clicking *What happens next?*. Not only are the three sentences read, but as each phrase is read, it is highlighted on its button. The user must then choose the button tool from the HyperCard tools menu and rearrange the text until it makes sense. Clicking on the buttons at any time will allow them to be spoken and the correct order may be checked at any time regardless of where the buttons are moved to. The text in the buttons is easily changed and new speech may be added using MacRecorder. Digitised sound makes this exercise more meaningful since words are spoken clearly and with correct intonation.



basking on a rock.

he went looking for his wife.

He found her kneeling

She was watching a lizard

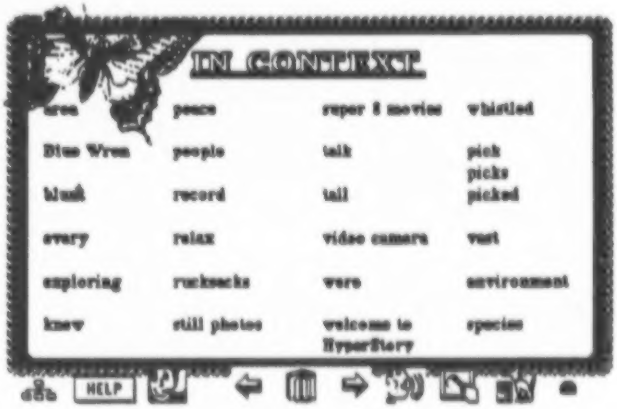
When Jim had finished,

beside a creek.

Figure 11.20: *Story Page 4. Digitised sound buttons may be moved anywhere on the screen in order to make sense of these phrases.*

Speech glossary

The final cards, *Glossary* and *In Context*, allow the user to hear the digitised words used in the stack, simply by clicking on them. *In Context*, also takes the user to the card in which the selected word appears. The task is then to find the word and read it in context (**Figure 11.21**).



area
Blue Wren
bluff
every
exploring
knew

peace
people
record
relax
rucksacks
still photos

super 8 movies
talk
tall
video camera
were
welcome to HyperStory

whistled
pick
picks
picked
vast
environment
species

Figure 11.21: *In Context. From this card the user is taken to a card where the selected word is used in context.*

Working with an adult student

HyperStory provided ideas for using HyperCard. The next step was to work with an adult literacy student and use some of those ideas.

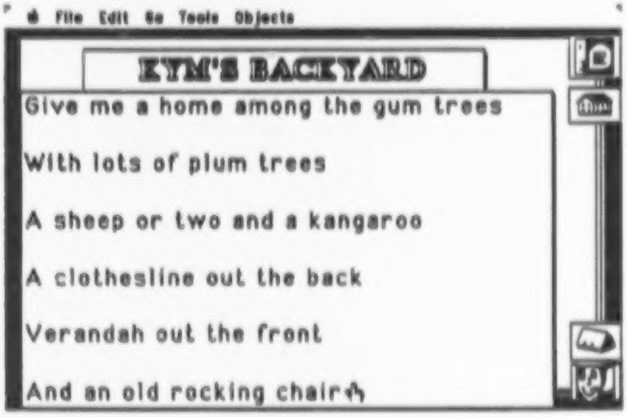
Kym Langdon, a student at the ALU, was suggested as a possible candidate to work with. Kym and his volunteer tutor, Maree Miller, were approached about making a HyperCard stack, and a regular work time was negotiated. At the first session, Kym was shown a card with a verse of a popular song. It was the first verse from the popular TV program, *Burke's Backyard.* This was chosen because it was likely that text could be predicted because of familiarity with the song, even if the words could not be read out of context. Each line of the song could be heard by clicking on a transparent speech button, which had been placed over the text.

Kym was impressed by what he heard and we decided to develop a further card, at each session, with information about him. Each card involved discussing and identifying a topic; Kym composing sentences for his volunteer tutor to enter; Kym deciding where he wanted reading clues in his text, and what sort of clues these should be; and creating buttons and recording sound clues, using MacRecorder.

At each subsequent session Kym was asked to try to read the previous week's card and then we worked on a new card.

Exploring Kym's Stack

Kym's Stack is a six-card stack which was made with Kym Langdon, an adult non-reader. The purpose of this stack was to explore HyperStory ideas, including scripting, with an adult student who was enrolled in a literacy class. Most decisions about f[illegible]s, style and types of clues were made by Kym. MacRecorder was used to create digitised speech buttons. *Kym's Backyard* (see **Figure 11.22**), a card to introduce Kym to computers and HyperCard, used digitised speech buttons for each line of a song. By clicking on the title, which started as *Burke's Backyard*, all buttons were played in order. This card had no visible background buttons when it was first used; they were added later. The aim with this card was to introduce Kym to digitised speech and to the way buttons worked.



KYM'S BACKYARD

Give me a home among the gum trees

With lots of plum trees

A sheep or two and a kangaroo

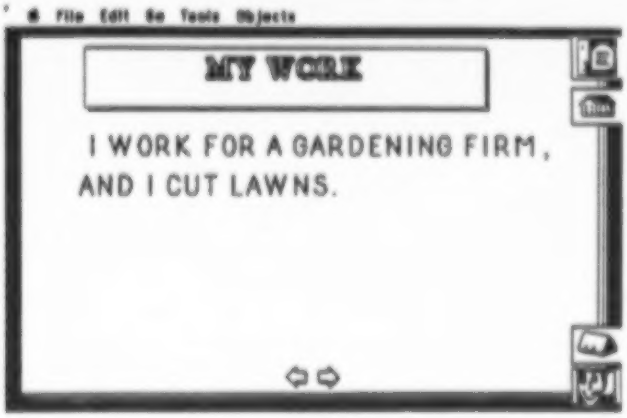
A clothesline out the back

Verandah out the front

And an old rocking chair

Figure 11.22: *Kym's Backyard was a starting point for creating a personalised student stack. The text here was in lower case. When Kym created his cards, he chose upper case for all text.*

After acquainting Kym with *Kym's Backyard*, a second card *My Work* (**Figure 11.23**) was created. This card has a title field and a main text field. Kym composed the sentence, his tutor typed it, and transparent buttons were created by him, with help, to provide reading clues.

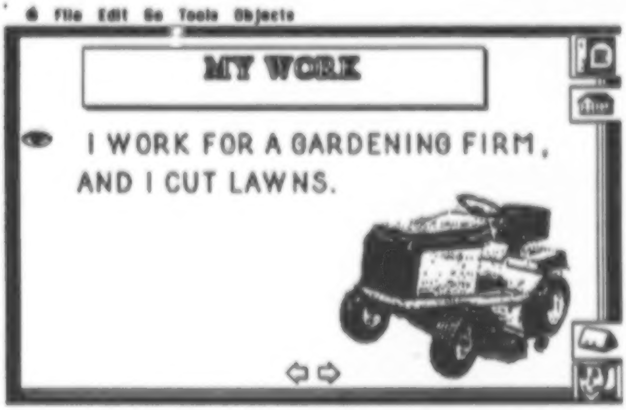


MY WORK

I WORK FOR A GARDENING FIRM,
AND I CUT LAWNS.

Figure 11.23: *My Work. The arrows were the only directional background buttons created for this card.*

The clues chosen by Kym were picture and sound clues. Kym chose the fonts and pitch and, as can be seen, elected upper case lettering. *WORK*, for instance, was given a picture clue: a ride-on mower, scanned from a newspaper, was made to appear and dissolve away (**Figure 11.24**). The first word in the text, *I*, proved a difficult word to read and so an *eye* picture was programmed to pop up and dissappear whenever *I* was clicked. For *WORK*, *GARDENING*, and *LAWNS*, Kym recorded his own voice, using MacRecorder (see **Figure 11.25**). For *FIRM*, Kym felt sufficiently confident that a one letter speech clue would be enough for him to predict the word from the text. Thus *FIRM* was recorded and only the *F* was used in a transparent speech button.



MY WORK

I WORK FOR A GARDENING FIRM,
AND I CUT LAWNS.

Figure 11.24: *MY WORK. Visual clues and digitised speech clues were used.*

The next card, *MY MODELS* (**Figure 11.26**), used only digitised speech buttons. We experimented with sound effects, from within the SoundEdit recording and editing program. Thus when *CHALLENGE* is clicked, the resulting voice is a reverberating echo. This created a distorted sound but Kym found it very appealing and he was able to read this word, without the clue, almost every time he visited the card. With this card, synthesised speech was introduced by copying the Speech button, from

HyperStory, as a background button for all cards. The synthesised speech facility was used often on the whole text, on words, and even just on letters.

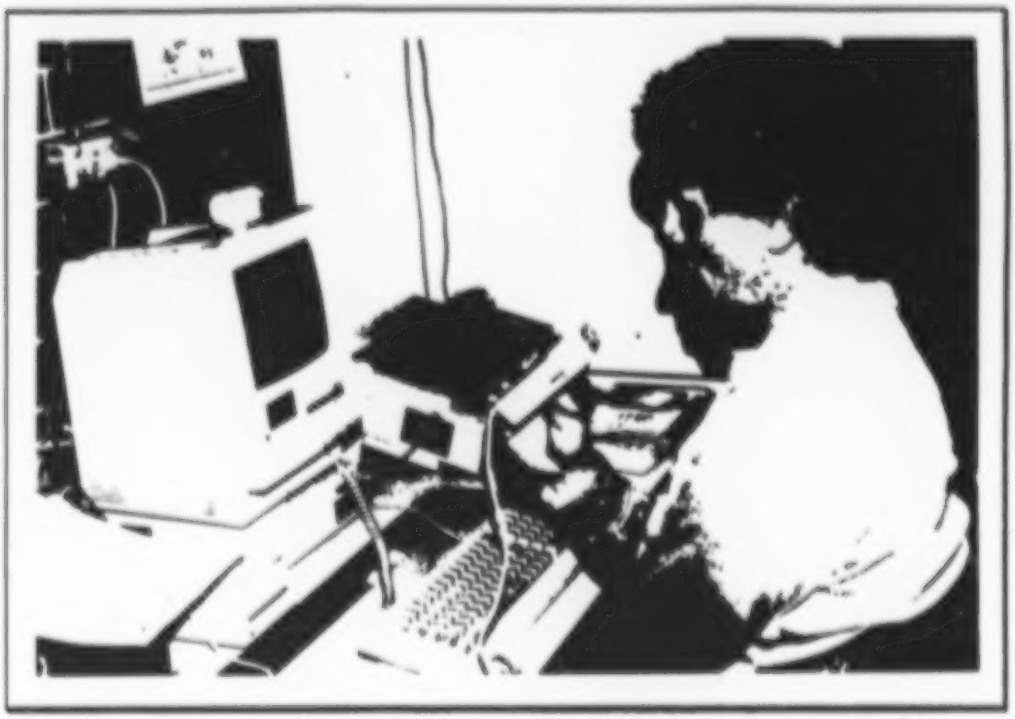
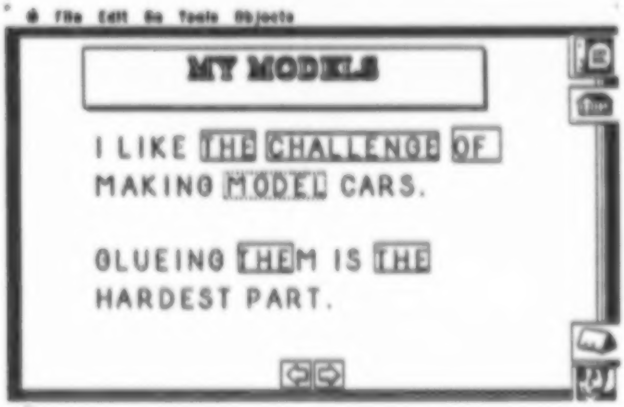


Figure 11.25: *Kym Langdon using MacRecorder to add digitised speech clues to Kym's Stack*



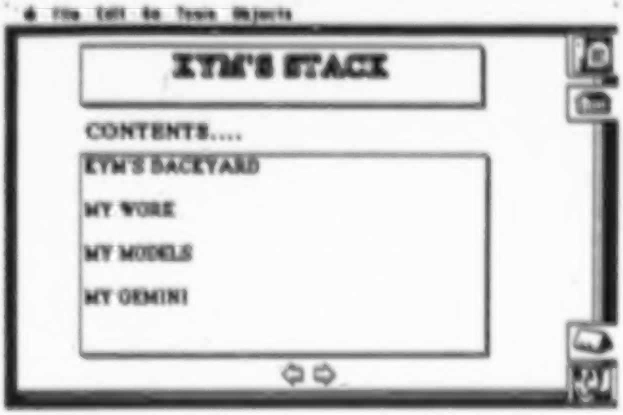
MY MODELS

I LIKE THE CHALLENGE OF MAKING MODEL CARS.

GLUEING THEM IS THE HARDEST PART.

Figure 11.26: *The MY MODELS card shows the rectangular buttons created by Kym Langdon and positioned over selected words.*

In response to the growing need to navigate the stack, the Kym's Stack contents card was developed, along with a background button which allowed Kym to return to this contents card from any card in the stack (**Figure 11.27**). As a new card was created, its name was added and a transparent button was placed over it. Further, it was decided to add a home button and a feedback button. The feedback button, at the top right of each card, is different from the usual computer generated responses. When clicked, this button produces digitised cheers and whistles, and a synthesised *Well done Kym*, accompanied by these words in the title field!



KYM'S STACK

CONTENTS....

KYM'S BACKYARD

MY WORK

MY MODELS

MY GEMINI

Figure 11.27: *The index card for Kym's Stack provides access to all other cards.*

The final cards on Kym's Stack were about Kym's recently purchased car. This was something Kym felt proud of and really wanted to write about. Although a non-reader, Kym had shown good visual recognition skills during the creation and manipulation of objects for his stack. He was not able to read items from menus and dialog boxes, but he could locate and select functions needed to achieve a particular action. There were a number of ideas in HyperStory which Kym was keen to try in subsequent cards on this stack that *he* had created.

12 Issues, Prospects and Potential

This report focuses on the use of *new technologies* in Australian adult literacy programs. The need for adult literacy programs has been argued within the context of a broader definition of literacy, a definition which incorporates cultural as well as critical components. New technologies offer alternatives which change traditional learning environments; they create a broader range of learning possibilities, a richer diversity of experiences.

Two important questions need to be asked of new technologies: Do they help us do our present work more efficiently and effectively? And do they enable us to do things which were previously impossible? (Smith 1988). The observations of the new technologies in the several case studies reported in previous chapters suggest that generally both questions may be answered in the affirmative.

In traditional adult literacy provision, many individuals cannot be assisted effectively to acquire literacy skills. Literacy providers cannot furnish all things for all learners. A broader range of learners may be catered for through the use of technology. For example, the use of teleconferencing and narrowcast television, not only addresses the problems of distance education but also caters for disadvantaged groups of learners, in this case Aboriginal adults, in innovative and personally satisfying ways. *The Aussie Barbie* interactive videodisc provides an alternative to the teacher intensive tradition of teaching English to second language learners. ESL learners may communicate their needs *non-verbally*. They have the power to direct their learning. Blind and visually impaired learners may alleviate their handicaps in our print dominated world with *talking* computers.

Emerging issues

There is a number of strong threads running through this report. One is the emergence of speech as *the* key innovation in new educational technologies. Another is the development of technologies offering true interaction, allowing greater user control and autonomy over learning. A third is the use of graphics and animation as an enhancement and supplement to predominantly print-based instruction.

Apart from body language, speech is the first and only means of communication for many adult literacy learners. It seems natural that technologies geared to assisting the acquisition of literacy skills should make use of speech. However, it has only recently become possible, with the advent of powerful microcomputers, to incorporate synthetic or digitised speech in learning materials. With the aid of speech, learners are helped to make connections between what they know and what must be read and comprehended. Speech provides clues which help learners think about what is presented to them. Learners are able to work with educational materials in an independent, self-confident manner, calling on available speech clues, very much as one can with a personal tutor but without being dependent on another's help and expertise. Developments in computer media and optical disc are making it possible to provide such instructional guidance. With the help of speech-enriched technology, learners can expect to be more successful with their learning. Programs are easier to operate, feedback is more effective, and learners can achieve a better understanding of learning tasks and activities because many of the operating problems are eliminated.

The use of digitised speech, providing clarity and intonation, opens up many possibilities for adult literacy provision. The Lexiphon system, for instance, and interactive videodisc, coupled to the huge storage capacities of optical disk open new vistas to educators. The creation of digitised sound and picture banks will add new dimensions to learning.

Interaction is a dominant feature of new technologies. Learners are encouraged to respond to one other or to the computer in an active mode at a multisensory level. With the interactive approach, users are encouraged to make decisions, to choose how and what they will learn. Programming languages like HyperCard are capable of harnessing and accessing a variety of media thus allowing computer interactions to be multimedia in nature. Teachers can create programs which are not only customised to suit the interests of students but are also modifiable by students. These programs can respond to user requests by using digitised and/or synthesised speech, sound effects, hand drawn or scanned graphics, and animation, to create new kinds of text which can assist the user at a number of different competency levels.

The improved graphics capabilities of new generation technology mean that learning no longer has to be print-based. Learners can interpret messages with the aid of diagrams, photographs, animation and video, all linked to text or speech in an exciting and success oriented manner. There is little doubt that graphic clues assist low literate learners in making sense of text. The visual clues that are so much part of our everyday lives can now become part of a customised learning experience. Our daily experiences are rich with images, sounds and decisions based on them. The new technologies can more realistically than ever before meld together a number of sensory inputs into meaningful thought provoking, specifically tailored learning experiences.

Challenging opportunities

Computer-based technologies should not be used just because they are there, or because a great deal of capital has been outlayed on their development. There is need for careful evaluation and they need to be demonstrated to be effective with students in ordinary learning environments. With the possible exception of *The Aussie Barbie*, full-scale evaluation of other educational technologies included in the case studies of this report still remains to be done. The Lexiphon system, for example, is highly innovative in design and would appear to offer considerable promise in foreign language learning; it should now be subjected to external evaluation.

If technologies are to be viewed as tools, they should only be used when and where appropriate, the needs of individual learners taking precedence. The experience with narrowcast television brings home the need to evaluate the benefits and limitations of any technology before program implementation, *and* throughout its use. In the case of outback Aboriginal learners, the use of DUCT for teleconferencing may well be more appropriate for the learners and their particular situation and experience than newer, more expensive, although highly innovative developments, such as narrowcast television.

The comments made above with respect to equipment apply with equal force to software. Very few software programs examined in this report were field tested or based on educational theory, the software from Pennsylvania State University and Flinders University being notable exceptions. Teachers should be encouraged to report their experiences of using software with different groups of students; and software developers need to document claims of educational effectiveness.

Adult literacy programs have traditionally been poorly funded. Within existing funding structures, the purchase of new equipment is a real problem. There is the danger that the purchase of new equipment will be at the expense of other more traditional learning materials. At the same time, teachers are to be encouraged to be professional and flexible, and to experiment with new approaches and new tools that will continue to become available. The hope is that, given a greater understanding of the extent of the literacy problem, literacy programs will attract more substantial funding.

Clearly, there is a need for teacher education in the management and use of new technologies. The case studies in this report highlight successful applications of technologies to learning situations. The indications are that, when teachers have the knowledge and skills to be comfortable with a particular form of technology, they are more likely to use it appropriately. The emphasis, for teachers, must be on making choices. Technology is available to do what was not previously possible. The challenge facing adult literacy providers is to find the most effective uses for it.

Technology is not a substitute for other methods of instruction; it is only part of a battery of tools that teachers and learners have at their disposal to help make learning more effective. Part of the *technology problem* for adult literacy programs is the composition of the teaching force. For many part-time, volunteer staff, whose preparation for literacy teaching may not have included computer education, using new technologies becomes a personal hurdle; traditional methods may be viewed as safer and less threatening. One might envisage the job specifications of literacy teachers of the future including regular retraining time and formal courseware development and management time; teachers will become *managers* of learning environments.

The microcomputer era is barely a decade old and not all teachers have come to terms with computers in the classroom. Yet, already, there is every indication that we are at the tip of the iceberg in terms of teacher-generated learning materials. The current vast array of computer software is only the beginning of a potential software explosion which will take place due to the capabilities of new technologies. Two important concerns are alluded to in this Report. The first is the need to evaluate and catalogue software suitable for adult literacy use. The lack of useful guidelines, in the literature, became evident during the development of the evaluation criteria used in this report. Appropriate software evaluation guidelines must be generated for the benefit of teachers and developers.

The second major concern reflects the nature of the relationship between educator and programmer or developer. There is now, more than ever before, a need for those who develop educational software to work together with educators to create learning materials which use the potential of new technologies to their fullest. Educators need to be involved in the organisation and preparation of television materials. A multidisciplinary approach is likewise called for in the development of Lexiphon learning materials. Although new authoring tools, like HyperCard, offer educators greater creative freedom over what they use, there is no guarantee that the resultant software will be any better in design and application than programmer-generated software. What it does suggest is that design of *top quality* courseware must become more collaborative. Once a good design is developed in this manner, educators could modify it to suit individual student needs.

Increasingly, advances in technology are hiding the computer keyboard. The Lexiphon System, using light wand and modified text materials, and *The Aussie Barbie*, using touch screen, both illustrate this shift to an easier interface between user and machine. Using Lexiphon's light wand is very much a familiar experience, not unlike using a marking pen to highlight words. With *The Aussie Barbie* touch screen, the ESL user is free to explore *whole language* directly without having to negotiate first a collection of abstract symbols on the keyboard. Current microcomputers, with mouse-driven software, also offer adult literacy learners the opportunity to interact at a higher level than was previously possible with keyboard-only programs. Talking computers, such as those used by Associations for the Blind and in some libraries, may well evolve into voice recognition systems with enormous optically stored, erasable, digital vocabularies.

The overriding impression from this evaluation of technology in adult literacy programs around Australia, in comparison with developments in other countries, is the very wide range of technology in use. The case studies have focused not only on computers but on television, video, satellite and optical laser disc. Evident in this focus is the transition in software development from silent learning tools to tools with speech capabilities. Another impression, almost as prevailing as the former, is the way Australia is taking a lead in certain developments in the adult literacy field. Technology, like Lexiphon, has been developed in Australia, often on shoestring budgets. DUCT, too, is an Australian invention. Both break new ground in providing literacy services to adults.

Yet other impressions from this national survey are how literacy materials are being developed for adult learners in ways that are uniquely Australian, and how these are being employed by teachers in innovative ways. *The Aussie Barbie* ranks high in comparison with videodiscs produced elsewhere. The sense of humour in many of the film sequences is part of what makes this disc particularly effective with second language learners as well as peculiarly Australian. Indigenous software, such as that employed in the talking computers for the blind, is similarly innovative, while at the same time designed to meet real needs. These developments, in software and in hardware, need now to be developed further, to be marketed and exported.

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